DISTANCE EDUCATION

M.Sc. DEGREE EXAMINATION, DECEMBER 2023

First Semester

Chemistry

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. Why the second ionization energy of Na is very high as compared to its first ionization energy?

2. Draw the molecular orbital energy level diagram HF molecule.

3. Explain the Born-Lande equation.

4. Explain the reason for the ionic compounds dissolve in water.

5. What is Bronsted acid? Give an example.

6. What are differences between Bronsted and Lewis acids and bases?

7. Explain Keggin structure.

8. What are zeolites?

9. Define the semiconductor and transistors.
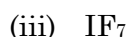
10. Define Schottky defect.

PART B — (5 × 5 = 25 marks)

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

11. (a) Discuss the periodic trend of ionisation potential and election affinity in the periodic table.

Or

(b) Based on VSEPR theory discuss the structure of

(i) $BeCl_2$

(ii) NH_4

(iii) IF_7

12. (a) Explain the homo and hetero nuclear diatomic molecules with examples.

Or

(b) Define lattice energy and calculate the lattice energy of NaCl using Born Haber cycle.

13. (a) Give an account of Pearson's concept of HSAB.

Or

(b) What is meant by buffer solution? Explain the briefly its importance with suitable examples.

14. (a) What are isopolyanion and heteropoly anions? Give one example for each type.

Or

(b) What are silicates? How are they classified.

15. (a) How will you determine the packing fraction in BCC and FCC?

Or

(b) Explain the structure of graphite and diamond.

2   **D-2259**

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain the hybridization of following molecules : CH_4, C_2H_4, C_2H_2, PCl_5, SF_6.

17. State the VSEPR theory and explain with proper examples.

18. (a) Define Lewis acid and base. Explain the relative order of basic strength of hydrides. (6)

    (b) Explain the relationship between electronegativity and hard-soft behaviour of acids and Bases. (4)

19. Write short notes on :

    (a) Feldspar

    (b) Zeolites

    (c) Clay minerals

    (d) Molecular sieves

20. Write short notes on :

    (a) Nickel Arsenite

    (b) Schottky and Frenkel defects in solids

    (c) Beta-cristobolite

    (d) Metal deficiency defect.

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D-2259

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION,
DECEMBER 2023

First Semester

ORGANIC CHEMISTRY – I
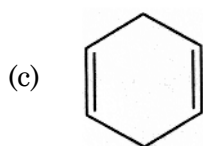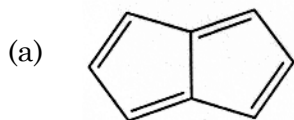
(CBCS 2018-19 Academic Year onwards)

Time : Three hours   Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. State Mesomeric effect with example.

2. Illustrate hyperconjugation.

3. Differentiate configuration and conformation.

4. Define Chirality.

5. Which among the following are antiaromatic? Give reason :

   (a)   (b)

   (c)

6. State microscopic reversibility.

7. Draw classical and nonclassical carbocations.

8. Write Baeyer Villager rearrangements.

9. List out ring deactivating group.

10. State Saytzeff Rule with one example.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Give two examples for aromatic, antiaromatic, homoaromatic and nonaromatic compounds.

Or

(b) Describe the aromatic character of ferrocene and fulvene.

12. (a) Illustrate axis, plane, center and alternating axis of symmetry with suitable example.

Or

(b) Discuss stereochemistry of binaphthyls.

13. (a) Explain structure and stability of carbocations with examples.

Or

(b) Write notes on the mechanism of pinocol-pinacolone and semi-pinacol rearrangement.

14. (a) Describe the following with suitable example.

Or

(b) Discuss stereochemistry of spiranes.

2 **D-2260**

15. (a) Explain the following :

 (i) O/P ratio;

 (ii) Gatermann Koch formylation mechanism

Or

 (b) Sketch the mechanism for Beckmann and Demzonev rearrangement.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Describe the aromaticity of Larger annulenes and fullerenes.

17. Explain the following mechanism with example :

 (a) S_N1 and S_N2

 (b) Elimination-addition reaction

18. Write notes on :

 (a) Kinetics of aliphatic nucleophilic substitution reaction

 (b) SE1 and SE2 mechanism.

19. Discuss the reaction and mechanism of the following

 (a) Von-Richter reaction

 (b) Addition-elimination reaction.

20. Explain Aromatic electrophilic substitution reaction and its features.

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3 **D-2260**

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, DECEMBER 2023

First Semester

PHYSICAL CHEMISTRY — I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What do you mean by degradation of energy, and give an example?

2. How do you state the third law of thermodynamics?

3. What is meant by the mean ionic activity coefficient?

4. Write the significance of the transport number.

5. Why is the EMF called force?

6. What is electrode potential, and write an example?

7. Which operators help in quantum mechanics?

8. What are eigenvalues and eigenfunctions in quantum chemistry?

9. Write the definition of consecutive reactions with an example.

10. What is an explosive chemical reaction?

PART B — (5 × 5 = 25 marks)

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

11. (a) What are the four processes of the Carnot cycle?

Or

(b) What is the Nernst heat theorem, and explain it in detail?

12. (a) Write notes on the Entropy of Mixing.

Or

(b) What are the different types of electrodes used in an electrochemical cell?

13. (a) Write the photoelectric effect, and give an example.

Or

(b) Discuss the Heisenberg's Uncertainty Principle.

14. (a) How do you solve a Particle in a one-Dimensional Box?

Or

(b) What are potential energy surfaces, and explain with example?

15. (a) Write notes on the Kinetic Isotopic Effect.

Or

(b) How is the Nuclear Magnetic Resonance (NMR) used for the kinetics complexation reactions?

2 **D–2261**

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Derive the Gibbs Helmholtz Equation and its applications.

17. Draw detail notes on Gibb's Duhem Equation.

18. Drive the Debye-Huckel theory of interionic attraction.

19. Write the derivation of the Schrodinger Equation Particle in a three-Dimensional box.

20. Write notes on the Absolute Reaction Rate Theory (ARRT).

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DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION,
DECEMBER 2023.

Second Semester

INORGANIC CHEMISTRY – II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours　　　　　　　Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1.　Write spectrochemical series?

2.　What are the factors affecting 10 Dq?

3.　What is meant by Q - Value?

4.　Write down any two properties of alpha decay.

5.　How C^{14} dating used in neutron activation analysis?

6.　List the series of radioactivity.

7.　Give general electronic configuration of lanthanide and actinide.

8.　What is solvent extraction?

9. Give one example for optical isomerism in octahedral complexes.

10. Provide various oxidation states of lanthanides.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Compare VBT and CFT.

Or

(b) Differentiate ferro, ferri and anti-ferromagnetisms.

12. (a) Discuss nuclear liquid drop model and its merits.

Or

(b) Sketch and explain about Geiger Muller counter.

13. (a) Write notes on synchrotron.

Or

(b) What are applications of C-14 dating for various field?

14. (a) Write notes on lanthanide and actinide contraction.

Or

(b) Describe about lanthanide separation techniques 'Fractional crystallization'.

15. (a) What are the factors affecting nuclear stability?

Or

(b) List out the uses of lanthanides and actinides.

D–2262

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions

16. Discuss the concept of MOT of octahedral complexes.

17. Explain the salient features of John-teller distortion theorem.

18. Write short notes on the following

    (a) Spallation reaction;

    (b) Nuclear cross section;

    (c) Half-life period

19. Describe the occurrence, extraction of lanthanide ions.

20. Explain in detail about principles and applications of neutron activation analysis.

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3   **D–2262**

DISTANCE EDUCATION

M.Sc. (Chemistry)DEGREE EXAMINATION,
DECEMBER 2023.

Second Semester

ORGANIC CHEMISTRY – II

(CBCS 2018 – 2019 Academic Year Onwards)
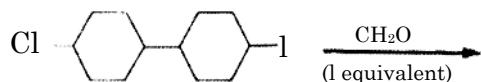
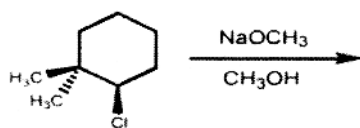Time : Three hours   Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)
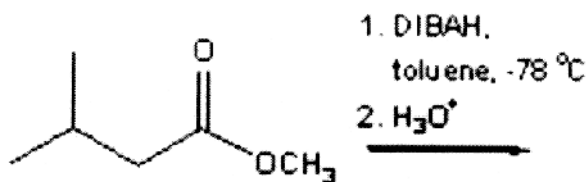
Answer ALL questions.

1. Predict the product for the following elimination reaction.

2. Write a short note on Bredt's rule.

3. Predict the most likely mechanism and the product for the reaction below.

4. What is the major organic product obtained from the following reaction?

1. DIBAH,
   toluene, -78 °C
2. H_3O^+

5. What is the major organic product obtained from the following reaction?

H_3O^+
$HgSO_4$

6. What do you understand by prochirality?

7. What are the reactions involving free radicals?

8. Write a short note on quantum efficiency.

9. Discuss the mechanism of 1,3 dipolar addition.

10. In a Diels-Alder reaction between two moles of cyclopentadiene or between maleic anhydride and cyclopentadiene it is the endo product rather than exo product which is formed. Give reasons.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Discuss the Hofmann rule.

Or

(b) Discuss the mechanism and predict the products from the reaction of bromine with propene dissolved in methanol containing lithium chloride.

2   **D–2263**

12. (a) Describe the electronic mechanism of addition of ammonia and amine derivatives to the carbonyl group.

Or

(b) Discuss Sachse-Mohr's theory of strain less rings.

13. (a) Illustrate the mechanism of Wolff rearrangement.

Or

(b) Explain Nitrene cycloaddition.

14. (a) Discuss the reaction mechanism of Hunsdiecker reaction.

Or

(b) How does a triplet state differ from singlet state? Explain by taking a suitable example.

15. (a) Illustrate the mechanism of photochemical addition of carbonyl compounds of alkenes.

Or

(b) Discuss the mechanism of Diels-Alder reaction.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions

16. (a) How the pyrolysis does take place in ester?

(b) Discuss the stereochemistry of addition reactions.

17. (a) Illustrate the concept of Aldol condensation with the help of some examples.

(b) Write short notes on:

(i) Boat and chair forms

(ii) Eclipsed and staggered forms

(iii) Axial and equatorial bonds

3   **D–2263**

18. (a) Discuss Carbene insertion and addition reactions.

    (b) Write a short note on the following reaction:

        (i) Barton

        (ii) Gomberg

        (iii) Sandmayer

19. (a) Explain the following terms in brief:

        (i) Excited singlet state

        (ii) Intersystem crossing

        (iii) Internal conversion

    (b) Explain the difference between electrocyclic reaction and cycloaddition reaction.

20. (a) Discuss the mechanism of cope's rearrangement.

    (b) Discuss the mechanism of claisen rearrangement.

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DISTANCE EDUCATION

M.Sc.(Chemistry) DEGREE EXAMINATION,
DECEMBER 2023.

Second Semester

PHYSICAL CHEMISTRY – II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours   Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1.   What is mean by physical adsorption?

2.   Give an example of unimolecular surface reaction

3.   What is the chemical composition of detergents?

4.   What is mean by fluorescence process?

5.   What is mean by internal conversion?

6.   What is mean by photo-degradation?

7.   Define the term colloids

8.   What is called biodegradable polymers?

9. Define polymer electrolyte

10. Explain the solar cells with diagram

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Explain the Gibbs adsorption isotherm.

Or

(b) Explain the term micelles? Explain the mechanism of micelles formation.

12. (a) Write about the detailed mechanism of phosphorescence.

Or

(b) What is called actinometers? Explain with working principle.

13. (a) Write about the decomposition of organic carbonyl compounds.

Or

(b) Write down the radiolysis of water.

14. (a) Explain the mechanism of radical polymerization process.

Or

(b) Explain the thermally stable polymer and given an example preparation.

15. (a) Write about the conducting polymers and explain with example.

Or

(b) Write about the hydrogen evolution reaction.

2 **D–2264**

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions

16. Write about the Langmuir-Hinshelwood mechanism. (10)

17. Explain

    (a) Surfactants (3)

    (b) Spreading of liquid on another (3)

    (c) Explain the Langmuir adsorption with an example (4)

18. Write about the emulsion polymerization and its significance. (10)

19. Write about the mechanism of bulk polymerization. (10)

20. (a) Explain the anionic polymerization with example. (5)

    (b) Explain the artificial photo-synthesis process. (5)

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D–2264

DISTANCE EDUCATION

M.Sc.(Chemistry) DEGREE EXAMINATION,
DECEMBER 2023.

Third Semester

ADVANCED INORGANIC CHEMISTRY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours   Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1.   Explain chelate effect.

2.   Write about electron transfer reaction?

3.   What is mean by normal spinel? Give one examples.

4.   Draw the structure of any two metallocene.

5.   What are functions of haemoglobin?

6.   Write down on Ziegler-Natta Polymerization.

7.   Give two examples for labile and inert complexes.

8.   Provide any two synthetic methods for the preparation of carborane.

9.   Illustrate trinuclear cluster formation.

10. What is fluxional molecule.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Explain the kinetics and mechanism of labile and inert complexes.

Or

(b) Compare inner sphere and outer sphere processes in complexes.

12. (a) Describe the following terms in electronic spectra

(i) selection rule;

(ii) Band intensities;

(iii) Band widths

Or

(b) Write notes on 'Perovskite Structures'.

13. (a) Dewar-Chatt approach to bonding in olefin. Explain.

Or

(b) Describe about the preparation and properties of ferrocene.

14. (a) Explain about structure and function of carboxy peptidase -A.

Or

(b) Write the mechanism of the following

(i) hydroformylation

(ii) Monsanto process

2 **D–2265**

15. (a) Write short notes on metal poisons and chelating agent in medicine.

Or

(b) What are the metal clusters and their types and examples?

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions

16. Derive the relation between the stepwise and overall stability constants of complexes. How will you determine the stability constant of coordination compounds?

17. Sketch and explain the two set of Orgel diagram.

18. Write short notes on the following.
    (a) Trans effect
    (b) Wade's rule

19. Discuss about the synthesis, structure of metal carbonyls

20. Describe about structure and function of vitamin B_{12} and B_{12} coenzymes

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D–2265

DISTANCE EDUCATION

M.Sc. (Chemistry) EXAMINATION, DECEMBER 2023.

Third Semester

ADVANCED ORGANIC CHEMISTRY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1.   What is Collins-Ratcliff oxidation?

2.   Define ozonolysis.

3.   What is retrosynthetic tree?

4.   Identify the product

$$RCOOH + R'OH \xrightarrow{\text{DCC}} ?$$

5.   What are polysaccharides?

6.   What is N-terminal residue?

7.   Define coenzyme.

8.   What are nucleosides?

9.   Give two examples for water soluble vitamins.

10. Draw the structure of α - pinene.

PART B — (5 × 5 = 25 marks)

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

11. (a) Write a note on MPV reduction.

Or

(b) Discuss about Prevost reaction.

12. (a) Give an account on Robinson's synthesis of anthocyanidins.

Or

(b) Discuss the significance of structure-goal based strategies in retro synthesis.

13. (a) Discuss the conformation of maltose.

Or

(b) Write the differences between DNA and RNA.

14. (a) Discuss the importance of end group analysis in proteins.

Or

(b) Explain the structure of camphoric acid.

15. (a) State the various functions of vitamin E.

Or

(b) Explain structure of progesterone.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. (a) Explain the mechanism of TEMPO catalyzed oxidation reaction of alcohols. (7)

(b) State the use of Wilkinson's catalyst with an example. (3)

2 **D–2266**

17. (a) Explain the method of Fisher's indole synthesis. (8)

(b) Anthocyanins $\xrightarrow{\text{dil.HCl}}$? (2)

18. Discuss in detail about the secondary structure of proteins.

19. Explain the structure of morphine. (10)

20. Discuss the structure of cholesterol. (10)

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D–2266

D–2267	Sub. Code
	34433

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, DECEMBER 2023

Third Semester

SPECTROSCOPY – APPLICATION IN ORGANIC AND INORGANIC CHEMISTRY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours   Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions

1. Define the term chromophore.

2. How to differentiate the keto group in acetaldehyde from acetone?

3. What is Fermi resonance?

4. Explain the stretching vibrations in NH_3 molecule

5. How many NMR signals will be observed for

   (a) $CH_3-CO-CH_3$

   (b) CH_3-CH_2-OH

6. What is TMS and why it is used as standard in NMR?

7. Define the g-value.

8. What is octant rule?

9. Give any two applications of turbidimetry

10. Explain the principles of flame photometry.

PART B — (5 × 5 = 25 marks)

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

11. (a) What is called Woodward–Fieser rules and explain with example?

Or

(b) What are called combination band? Explain with example.

12. (a) Discuss the basic principles of IR spectroscopy.

Or

(b) What is called Nuclear Overhauser Effect? Explain with example.

13. (a) What is mean by double resonance? Explain with example.

Or

(b) Write down the difference between NMR and ESR.

14. (a) Explain the principles of Mass Spectroscopy.

Or

(b) Draw and explain the instrumentation part of Mass spectroscopy.

D–2267

15. (a) Write the α–haloketone rule with example.

Or

(b) Write about the principles and applications of Nephelometry.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Write about the applications of UV-visible spectrum in quantitative analysis. (10)

17. (a) Explain

(i) Hook's law (3)

(ii) Overtone (3)

(b) What is mean by spin-spin coupling and explain with example? (4)

18. Write about the theory and instrumentation of NMR spectroscopy. (10)

19. Write about the application of ORD and CD curves. (10)

20. (a) Explain the principles of differential thermal analysis. (5)

(b) Explain the principles of Turbidimetry. (5)

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3 **D–2267**

D–2268	Sub. Code
	34441

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION,
DECEMBER 2023

Fourth Semester

ANALYTICAL CHEMISTRY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions

1. What are Errors?

2. Compare accuracy and precision.

3. Define 'confidence limit'.

4. How to reject the data based on Q-test?

5. Write notes on principle of electrogravimetry.

6. What is meant by controlled potential coulometry?

7. Sketch the TLC method.

8. Write an application of Gas chromatography.

9. Gives any two general methods for purification of chemicals.

10. Define isocratic elution in HPLC.

PART B — (5 × 5 = 25 marks)

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

11. (a) What is meant significant figures? How do you determine the significant figures by its rules.

Or

(b) Compare the results using "F–Test" and "T–Test".

12. (a) Give details on theory of coulometric analysis.

Or

(b) Discuss about cyclic voltammetry.

13. (a) Illustrate various types of paper chromatography.

Or

(b) Write down the application of gas chromatography.

14. (a) Brief the following (i) Sublimation (ii) Vacuum Distilation.

Or

(b) Theory on Gel permission chromatography.

15. (a) Discuss about instrumentation of GC-MS.

Or

(b) Describe about ion selective electrodes.

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PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Discuss about the following (a) systematic and random errors; (b) absolute and relative errors.

17. Explain the principle and applications of polarography.

18. Describe about principle, instrumentation and application of HPLC.

19. What are the types of equipment employed for Di-electrophoresis and give their applications.

20. Comment on the following (a) Standard deviation; (b) Regression analysis; (c) Chronopotentiometry.

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DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION,
DECEMBER 2023.

Fourth Semester

APPLIED CHEMISTRY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours   Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions

1.   State the ill effects of acid rain.

2.   What are batteries?

3.   Define corrosion.

4.   What are corrosion inhibitors?

5.   Define current density.

6.   Write any two applications of electro forming process.

7.   What are nano composites?

8.   Define thermolysis process.

9.   Write a program to calculate the solubility product of a salt.

10. State the use of chemical data base sites.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions, Choosing either (a) or (b)

11. (a) Explain the phenomena of global warming.

Or

(b) Describe the working of trickling filters.

12. (a) Write a note on high temperature corrosion.

Or

(b) Explain the process of galvanic corrosion.

13. (a) Explain the process of anodizing.

Or

(b) Discuss the principle of electroforming process.

14. (a) Explain how SEM analysis aids in the characterization of nano particles.

Or

(b) Write a note on micro emulsion method.

15. (a) Write a program to calculate the standard deviation of a data set.

Or

(b) Give an account on various search engines available in web.

2   **D–2269**

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. (a) Explain the chemical reactions that occurs discharging of lead acid battery. (6)

    (b) Write a short note on activated sludge process (4)

17. (a) Discuss the salient features of Fe-H_2O Pourbiax diagram. (7)

    (b) How proper designing of equipments controls corrosion? (3)

18. (a) Discuss the process of electroplating of copper in cyanide bath. (6)

    (b) Give the applications of electroforming process (4)

19. Give a detailed account on various types of chemical vapor deposition process. (10)

20. Explain how DTA and DSC studies assist in the characterization of nanoparticles (10)

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D–2269

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION,
DECEMBER 2023.

Fourth Semester

ADVANCED PHYSICAL CHEMISTRY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours   Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions

1.   How thermodynamic probability is related to entropy of a system?

2.   State Debye's T^3 law.

3.   State Hooke's law.

4.   What are Slater determinants?

5.   What are symmetry operations?

6.   Define center of symmetry.

7.   Write the matrix representation for C_2 axis of rotation.

8.   State factors which influence reaction rate in solution.

9.   What is primary salt effect?

10.   What are acid—base catalysts?

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions, Choosing either (a) or (b)

11. (a) Derive the relationship between enthalpy and partition function.

Or

(b) Derive the expression for Fermi – Dirac distribution law.

12. (a) Explain about variation theorem.

Or

(b) Explain the various assumption made by Huckel in HMO theory.

13. (a) State the various rules for forming a group.

Or

(b) Write a note on direct product representation

14. (a) Explain the application of ARRT in solution kinetics.

Or

(b) Discuss the importance of Taft equation.

15. (a) Explain about Zucker-Hammett equation.

Or

(b) Explain about single sphere model for the reaction of ions in solution.

D–2270

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Derive Maxwell — Boltzniann expression for most probable distribution of arranging "N" number of particles among various energy levels.

17. Calculate the delocalization energy of butadiene using HMO theory.

18. Construct the character table for C_3V point group.

19. (a) Predict the IR active modes of water molecule using group theory. (5)

    (b) Establish the relationship between equilibrium constant and partition function. (5)

20. Derive the Bronsted —Bjerrum equation.

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