D–2501	Sub. Code
	34411

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2026.

First Semester

INORGANIC CHEMISTRY – I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Using VSEPR theory, determine the shape of the molecule XeO_3

2. List the factors affecting the bond length.

3. Give the limitations of Bronsted concept of acids and bases.

4. What are Hard acids and bases? Give example.

5. Compare p-type and n-type semiconductors.

6. What are zeolites? Give its uses.

7. Define Schottky defect.

8. Write about the packing efficiency of FCC Structure.

9. What is meant by buffer solution?

10. How does the structure and hybridisation vary in diamond and graphite?

PART B — (5 × 5 = 25 marks)

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

11. (a) Give the postulates of VSEPR Theory. Explain the structure and bonding in XeF_4 molecules.

Or

(b) Explain the concept of hybridisation. Discuss the hybridisation and shape of NH_3 molecule.

12. (a) Compare and contrast Bronsted and Lewis acids and bases.

Or

(b) Explain HSAB Principle with its applications and limitations.

13. (a) Describe the structure of pyrosilicates using suitable diagram.

Or

(b) Write a note on Feldspar by explaining its structural framework.

14. (a) Explain the Ionic structure of Rutile and beta-cristobalite.

Or

(b) Write an explanatory note on Nickel arsenite structure.

15. (a) Discuss in detail about Frenkel defects.

Or

(b) Explain the electrical properties of Conductors and Semiconductors.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. (a) What is Born-Haber Cycle? Explain its significance.

(b) Explain four properties of Ionic compounds.

17. Discuss the energy levels in homo and heteronuclear diatomic molecules.

18. Explain the relative order of acid strength of boron halides and basic strength of hydrides.

19. Draw the crystal structure of graphite and diamond and compare the properties.

20. Write a note on the following

(a) Clay minerals (3)

(b) Rutile and Fluorite structure (5)

(c) Ortho and metasilicates (2)

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D–2502	Sub. Code
	34412

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2026.

First Semester

ORGANIC CHEMISTRY – I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Write the structural formulae for the following compounds
   (a) Naphthalene
   (b) Acridine
   (c) Pyrazole
   (d) Pyrene

2. Define Huckel's Rule for aromaticity with suitable examples.

3. What is mean by enantiomeric excess?

4. How to find out axial chirality?

5. What is semi-pinacol rearrangement?

6. Discuss stability of carbocation.

7. Write Friedel-craft acylation reaction. -

8. What is Chichibabin reaction?

9. Write benzene mechanism.

10. What is molecular rearrangement?

PART B — (5 × 5 = 25 marks)

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

11. (a) Explain the aromaticity of azulene and ferrocene.

Or

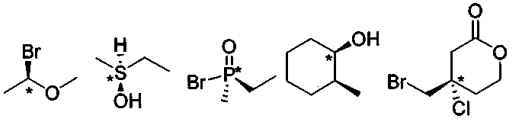
(b) Explain how inductive effect affects the strength of acids and bases.

12. (a) Write short notes on Cahn-Ingold-Prelog rule.

Or

(b) Define chirality. Explain their types in detail.

13. (a) Assign R/S configuration to the following compounds.



Or

(b) Differences between enantiomers and diastereomers

14. (a) Write the mechanism for Beckmann rearrangement.

Or

(b) Discuss about neighbouring group participation.

15. (a) Discuss about Vilsmeier-Haack reaction.

Or

(b) Give a detailed description of Von-Richter reaction.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Write short note on HMO theory.

17. (a) Explain Atropeisomlerism in details. (5)

(b) Explain various types of structural isomerism with examples. (5)

18. (a) Discuss Hammond's postulate. (5)

(b) Write pinacol-pinacolone rearrangement with mechanism. (5)

19. (a) Explain the factors affecting S_N1 and S_N2 reaction. (5)

(b) List the factors that affect aromatic substitution. (5)

20. Explain nitration and halogenation of benzene.

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D–2503	Sub. Code
	34413

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2026.

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. State any one form of II law of thermodynamics.

2. Mention the significance of Gibbs free energy.

3. Write the Gibbs-Helmholtz equation.

4. State the Debye-Hückel limiting law.

5. What is transport number?

6. Write Nernst equation for a cell reaction.

7. State Heisenberg's Uncertainty Principle.

8. What is an eigen function?

9. What is steady-state approximation?

10. Define kinetic isotope effect.

PART B — (5 × 5 = 25 marks)

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

11. (a) Derive the expression for entropy change during reversible isothermal expansion.

Or

(b) Explain Carnot's cycle and derive its efficiency expression.

12. (a) Discuss the construction of a calomel electrode.

Or

(b) Explain the applications of conductivity measurements.

13. (a) Write a note on wave particle dualism of matter.

Or

(b) Explain the concept of photo electric effect.

14. (a) Discuss the Lindemann mechanism for unimolecular reactions.

Or

(b) Write a short note on branched chain reactions.

15. (a) Explain the concept of overvoltage.

Or

(b) Discuss about Debye-Huckel-Onsagar equation

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. (a) Derive the expression br Gibbs-Duhem equation. (6)

(b) Explain degradation of energy in thermodynamic processes. (4)

17. (a) Derive Butler-Volmer equation for electrode kinetic process. (5)

(b) Derive Nernst equation. (5)

18. (a) Derive energy expression for a particle in a 1D box. (6)

(b) Explain how quantisation of energy arises in the 1D model. (4)

19. (a) Discuss the Hinshelwood theory for reaction kinetics. (6)

(b) Discuss the principle of microscopic reversibility with examples. (4)

20. (a) Explain the concept of fugacity. (5)

(b) Derive the expression for Schrodinger wave equation. (5)

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D–2504	Sub. Code
	34421

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2026.

Second Semester

INORGANIC CHEMISTRY – II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What is geometrical isomerism?

2. Give two differences between tetrahedral and tetragonal symmetries.

3. What is Antiferromagnetism?

4. Define nuclear fission.

5. What is nuclear spallation reaction?

6. How does CFT explain the colour of coordination compounds?

7. Compare weak field ligand and strong field ligand.

8. What is isotopic dilution analysis?

9. Give the uses of lanthanides.

10. Mention the reasons for actinide contraction.

PART B — (5 × 5 = 25 marks)

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

11. (a) Explain Optical isomerism in Octahedral complexes.

Or

(b) Describe Molecular Orbital theory of Square planar complexes.

12. (a) What is nuclear stability? Explain the factors affecting nuclear stability.

Or

(b) Explain the construction and working of Geiger muller counter.

13. (a) Discuss the Laws of radioactivity.

Or

(b) Write a note on Synchroton.

14. (a) Describe the extraction techniques of Lanthanides.

Or

(b) Explain the separation of Lanthanides by fractional crystallisation.

15. (a) Discuss in detail about the position of actinides in periodic table.

Or

(b) Explain the magnetic properties of lanthanides.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Describe spectrochemical series.

17. Compare Valence Bond Theory and Crystal field Theory.

18. Explain Para, dia and ferro magnetism with example.

19. Discuss the application of C^{14} dating in agriculture and biology.

20. Differentiate between lanthanides and actinides.

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D–2505	Sub. Code
	34422

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2026.

Second Semester

ORGANIC CHEMISTRY – II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Define Hofmann rule with suitable example.

2. Why the double bonds in bridgehead carbon compounds are unstable?

3. Write a Cannizzaro reaction with two example.

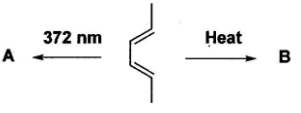
4. Compare the stability of *cis* and *trans*-decalin.

5. Write the Wolff rearrangement reaction with suitable example.

6. Explain Sandmeyer reaction with suitable example.

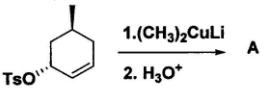
7. Define Photosensitization.

8. What are the major product of A and B in the following reactions?



9. Draw the more stable conformer of *cis*-1,4-dimethyl cyclohexane.

10. Find the major product A formed in the following reactions.



PART B — (5 × 5 = 25 marks)

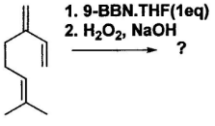
Answer ALL questions, choosing either (a) or (b).

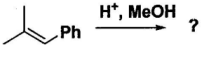
11. (a) Write the detail explanation of E2 elimination in cyclohexane system.

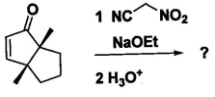
Or

(b) Explain the pyrolytic syn elimination with suitable examples.

12. (a) Write the major product formed in the following reactions. (2+1+2)

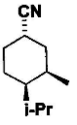
(i) 

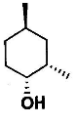
(ii) 

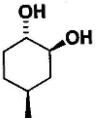
(iii) 

Or

(b) Write the more stable conformer for the following compounds is. (2+1+2)

(i) 

(ii) 

(iii) 

13. (a) Write any four methods for generation of carbene.

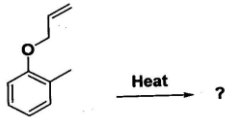
Or

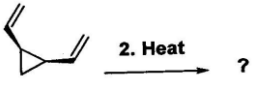
(b) Discuss the Beckmann rearrangement with suitable examples.

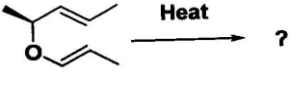
14. (a) Explain Norrish type-I reaction with suitable example.

Or

(b) Find the major product formed in the following reactions (2 +2+1)

(i) 

(ii) 

(iii) 

15. (a) How the Woodward rule will help to predict the periselectivity of products?

Or

(b) Discuss the topicity of ligands with suitable examples.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain the E1 and E_1CB mechanism with suitable examples.

17. (a) Discuss the reaction and mechanism of Grignard addition reaction. (5)

(b) Explain the A ^{1,3} strains with suitable examples. (5)

18. Discuss the stability and reactions of radicals with suitable examples.

19. Write a detail notes on Photooxidation and photo reduction reactions.

20. (a) Explain the 1,3-dipolar cyclo-addition reactions with suitable examples. (5)

(b) Write Barton and Hunsdiecker reaction with suitable examples. (2.5+ 2.5)

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D–2506	Sub. Code
	34423

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2026.

Second Semester

PHYSICAL CHEMISTRY – II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define the term adsorption isotherm.

2. What is Langmuir's adsorption isotherm?

3. What is surface excess?

4. Define phosphorescence.

5. What is radiation chemistry?

6. Mention any two chemical actinometers.

7. What is step-growth polymerization?

8. Define molar mass of polymers.

9. What are biodegradable polymers?

10. What is water oxidation reaction?

PART B — (5 × 5 = 25 marks)

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

11. (a) Explain about Temkin's adsorption isotherms.

Or

(b) Discuss Gibbs adsorption isotherm.

12. (a) Explain the importance of Langmuir-Rideal mechanism.

Or

(b) Describe about pulsed radiolysis process

13. (a) Discuss the steps of cationic polymerization process.

Or

(b) Write a note on functionality of monomer and degree of polymerization.

14. (a) Explain optical and kinetic properties of colloids.

Or

(b) Write a note on biodegradable polymers.

15. (a) Explain the concept of solar water splitting with a diagram.

Or

(b) Describe about dye-sensitized solar cells.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain in detail about BET adsorption isotherms.

17. (a) Discuss classification of polymers with examples.

(b) Explain kinetics of anionic polymerization process.

18. (a) Describe working of photovoltaic cells.

(b) Explain the principle of flash photolysis.

19. Discuss the kinetics of photochemical reaction between hydrogen and bromine.

20. Write a detail account on solution and suspension polymerization.

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D–2507

Sub. Code
34431

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2026.

Third Semester

ADVANCED INORGANIC CHEMISTRY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Define an overall formation constant.

2. Differentiate isomerization and recemisation.

3. State Laporte selection rule.

4. Write anation reaction.

5. Describe STYX notation.

6. List out the significance of metal-carbon bond.

7. Give example for fluxional in molecules.

8. What is the function of rubredoxin?

9. Draw the structure of myoglobin.

10. Write Reductive elimination reaction.

PART B — (5 × 5 = 25 marks)

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

11. (a) Discuss the relationship between entropy and the chelate effect.

Or

(b) Describe the principle and steps involved in the pH-metric method of stability constant determination.

12. (a) Discuss the factors affecting band intensity and bandwidth in electronic spectra of transition metal complexes.

Or

(b) Compare the merits and demerits of Orgel and Tanabe-Sugano diagrams.

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

Or

(b) Describe the preparation, properties and reactivity of ferrocene.

14. (a) Describe the Ziegler-Natta polymerization mechanism briefly.

Or

(b) Write a note on the Monsanto process for acetic acid production.

15. (a) Discuss about structure and function of Vitamin B_{12}.

Or

(b) Biological Roles of alkali and alkaline earth metal ions in biology.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain the following with suitable example.

    (a) Chelate effect

    (b) Trans effect

    (c) Template effect

17. Differentiate Normal and inverse spinels with suitable example.

18. Describe the structure and bonding in polyhedral boranes and carboranes.

19. Discuss about in detail about the structure and function of hemoglobin and myoglobin.

20. (a) Write the mechanism of hydrogenation and hydroformylation reaction.

    (b) Enumerate the steps involved in Nitrogen fixation.

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D–2508	Sub. Code
	34432

DISTANCE EDUCATION

M.Sc.(Chemistry) DEGREE EXAMINATION, MAY 2026.

Third Semester

ADVANCED ORGANIC CHEMISTRY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. What is the role of TEMPO in the oxidation of alcohols?

2. Write the reaction of a phenol with Fremy's salt and name the product.

3. What is the significance of Sharpless asymmetric dihydroxylation?

4. Name the products formed when an alkene undergoes ozonolysis.

5. Mention one major difference between heterogeneous and homogeneous hydrogenation.

6. What is Birch reduction and what type of product does it yield from aromatic rings?

7. What is Luche reduction and when is it used?

8. How does L-selectride differ from LiAlH4 in selectivity?

9. Define a synthetic equivalent with an example.

10. What is a 1, 3-dicarbonyl disconnection strategy?

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Discuss the oxidation of primary alcohols using PCC and TEMPO.

Or

(b) Explain the oxidation of phenols using silver carbonate.

12. (a) Describe the Sharpless asymmetric epoxidation with an example.

Or

(b) Write a note on the Prevost reaction and Woodward modification.

13. (a) Describe catalytic hydrogenation using Wilkinson's catalyst.

Or

(b) Explain the mechanism of McMurry coupling with an example.

14. (a) Compare the reactivity and selectivity of $NaBH_4$, and DIBAL-H.

Or

(b) Write short notes on Corey-Bakshi-Shibata (CBS) reduction.

15. (a) What are one-group and two-group C-X disconnections? Explain with examples.

Or

(b) Define and illustrate the importance of functional group interconversion.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain in detail the oxidation of alcohols to carbonyl compounds using Cr, Mn, and iodine-based reagents with mechanisms.

17. Describe different methods for the conversion of alkenes to diols and explain Sharpless asymmetric dihydroxylation.

18. Discuss various metal-based catalytic hydrogenations and the role of Li/Na in Birch reduction with mechanisms.

19. Describe the use of hydride reducing agents such as $LiAlH_4$, $NaBH_4$, DIBAL-H, and chiral boranes in stereo- and enantioselective reductions.

20. Explain the principles of retrosynthetic analysis with a focus on alkene and amine synthesis using disconnection strategies.

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D–2509	Sub. Code
	34433

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2026.

Third Semester

SPECTROSCOPY – APPLICATIONS IN ORGANIC AND INORGANIC 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 are bending and stretching vibrations in IR Spectra?

2. List the applications of UV-visible spectra.

3. What is Woodward - Fieser rule?

4. Mention the factors affecting chemical shift.

5. What is Nuclear Overhauser effect?

6. How Cotton effect occurs in ORD and Circular Dichroism?

7. What is Differential Thermal analysis?

8. Mention the applications of ORD.

9. Define thermometric titration.

10. Give the uses of Turbidimetry.

PART B — (5 × 5 = 25 marks)

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

11. (a) Describe the principle and instrumentation of IR Spectroscopy

Or

(b) Explain the factors affecting the intensity and position of absorption bands in UV-visible spectra.

12. (a) Describe the Theory of Proton NMR Spectroscopy.

Or

(b) Explain Spin tickling and double resonance in NMR Spectra

13. (a) Discuss the instrumentation of ESR Spectroscopy.

Or

(b) Explain McLafferty rearrangement that occurs in Mass spectra.

14. (a) Write a note on Circular dichroism.

Or

(b) Describe the principle of Optical Rotatory Dispersion.

15. (a) Discuss about Thermogravimetric analysis.

Or

(b) Explain the principle involved in Flame Photometry.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Discuss the theory and Instrumentation of C^{13} NMR Spectroscopy.

17. Explain the UV-visible spectra of aromatic carbonyl compounds.

18. Write a note on

    (a) Haloketone rule and Octant rule. (5)

    (b) Theory and Instrumentation of ESR Spectra. (5)

19. Describe Differential Scanning calorimetry technique with its instrumentation.

20. Discuss the Principle and Instrumentation of Nephelometry.

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D–2510

Sub. Code
34441

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2026.

Fourth Semester

ANALYTICAL CHEMISTRY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. What is a systematic error?

2. Define confidence limit.

3. What is the working principle of polarography?

4. List out the importance of half-wave potential.

5. Give principle of chronopotentiometry?

6. Explain RI values in chromatography.

7. Enumerate molecular ion peak in a mass spectrum.

8. What is the principle of ion exchange chromatography?

9. Write short note on gel permeation chromatography.

10. What is the equipment employed for electrophoresis?

PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Differentiate Accuracy and Precision with suitable example.

Or

(b) Explain the least square method for deriving calibration graph.

12. (a) Describe the principle and application of polarography.

Or

(b) Explain the principle and instrumentation of cyclic voltammetry.

13. (a) Discuss the principle and applications of GC-MS.

Or

(b) Explain the principle and instrumentation of chronopotentiometry.

14. (a) Sketch the various aspect of Gel permission chromatography.

Or

(b) What are the four steps of involved in electrophoresis?

15. (a) Explain the principle, procedure, and application of TLC.

Or

(b) Illustrate the following with suitable example.

(i) Vacuum distillation

(ii) Solvent Extraction.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. (a) What is Quotients test? How does rejection of a result based on it?

    (b) Write briefly about correlation coefficient.

17. Give an account of ion-selective electrodes.

18. Explain the Principle and procedure to conduct various types of Paper Chromatography Experiment.

19. Discuss the Principle and instrumentation and application of HPLC.

20. (a) Define electrodialysis. What are the controlling factors?

    (b) Describe about Theory and application of Ion exchange chromatography.

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D–2511

Sub. Code
34442

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2026.

Fourth Semester

APPLIED CHEMISTRY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. What is mean by Ozone hole?

2. Define pitting corrosion.

3. What are corrosion inihibitors?

4. How galvanic series differ from electro chemical series

5. What is mean by current efficiency?

6. Define Anodizing

7. Define nanomaterials in chemistry

8. What are the microscopic methods of nanomaterial characterization?

9. Define search engines

10. What is mean by virtual lab?

SECTION B — (5 × 5 = 25 marks)

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

11. (a) What is called acid radioactive pollution and explain their ill effects?

Or

(b) Write about the secondary methods of wastewater treatment

12. (a) Give an account of corrosion rate measurement.

Or

(b) Explain the Pourbaix diagram for Fe-H_2O system.

13. (a) Give an account of principles of cathodic protection.

Or

(b) Write about the composite coatings and their advantages.

14. (a) Write about the different types of fuel cells.

Or

(b) Write about the colouring of anodizing aluminium.

15. (a) Write about the CVD method of nanomaterial preparation.

Or

(b) Write about the TG/DTA and DSC methods of nanomaterial characterization.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Write about the physicochemical and biological investigations of water quality.

17. Write about the classification of batteries with suitable examples.

18. Write about the corrosion inhibitors for corrosion protection.

19. Write about the alloy plating of Brass.

20. (a) Explain the physical vapour deposition method for nanomaterial preparation. (5)

    (b) Explain the XRD and FT-IR methods of nanomaterial characterization. (5)

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D–2512	Sub. Code
	34443

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2026.

Fourth Semester

ADVANCED PHYSICAL CHEMISTRY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Define the term enthalpy.

2. What is the third law of thermodynamics?

3. Define heat capacity of a solid.

4. What is mean by Pauli's exclusion principle?

5. State Dulong- Petit's law.

6. Give an example for molecule with C2v point group.

7. Explain the point group in C_2H_2 molecule.

8. Define Bronsted acid with example.

9. What is mean by Edie equation?

10. Explain the Zucker Hammett hypothesis.

PART B — (5 × 5 = 25 marks)

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

11. (a) Explain the negative absolute temperature.

Or

(b) What are called partial functions? Explain them.

12. (a) Write the Einstein model of heat capacity of solids.

Or

(b) What is called elementary treatment? Explain with example.

13. (a) What is mean by Slater determinant? Explain its importance.

Or

(b) Write down the perturbation method to helium.

14. (a) Explain the rules for forming a group.

Or

(b) Explain the systematic assignment of point group for molecule with example.

15. (a) Write about the factors influence the reaction rates in solution.

Or

(b) Write about the primary salt effect.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Write about the one dimensional harmonic oscillator in detail. (10)

17. Explain :

    (a) Onsager reciprocal relations (5)

    (b) Fermi-Dirac distribution law. (5)

18. Write about the HOMO method and its application to butadiene. (10)

19. Write about the application of group theory to IR and Raman spectra. (10)

20. (a) Explain the Acid-Base catalysis (5)

    (b) Explain the Michaelis-Menton equation of enzymatic catalysis. (5)

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