DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2024.

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.   What is meant by bond energy?

2.   State the HSAB principle.

3.   Write Kapustinski equation and explain.

4.   Give important properties of delta bonding.

5.   Mention any two important properties of leveling solvent.

6.   What are isopoly acids?

7.   What are Ortho and meta silicates?

8.   Define : Frenkel effect.

9.   What are molecular sieves? Give an example.

10.   Draw the structure of 'diamond'.

PART B — (5 × 5 = 25 marks)

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

11. (a) How will you determine the lattice energy using Born-Meyer equation?

Or

(b) Explain briefly about Shapes of polyatomic molecules.

12. (a) Describe Bronsted concept of acids and bases and give its limitations.

Or

(b) Explain the theories of pH and Buffer solutions.

13. (a) Illustrate (i) Anderson structure; (ii) Keggin structure.

Or

(b) Discuss in detail about Zeolite.

14. (a) Write notes on FCC type of solids with examples.

Or

(b) Discuss the following

Metal excess and Metal deficiency defect.

15. (a) Draw the crystal structure of NaCl and rutile. Show the coordination around each type of ion in the structure.

Or

(b) List out the difference between semiconductors and insulators.

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PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. What is VSEPR theory? Give its postulates. Discuss the structures of XeF_4.

17. Account the following

    (a) Chemical periodicity of iconic radii;

    (b) Electrical conductivity of iconic compounds.

18. Explain in details about Lewis's acids and bases.

19. Discuss about various types of silicates.

20. Briefly describes about the following

    (a) Schotty and Frenkel defects;

    (b) Nickel arsenite structure.

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DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2024.

First Semester

ORGANIC CHEMISTRY – I

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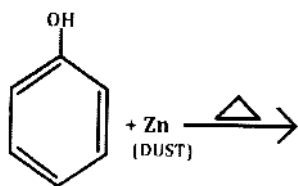
Time : Three hours   Maximum : 75 marks

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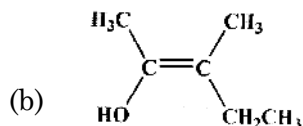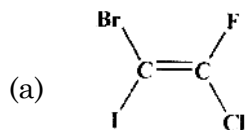
Answer ALL questions.

1. What are the important characteristics of aromatic compounds?

2. Write the product :

3. Label each asymmetric carbon in the compound below as R or S.

4. What is axial chirality?

5. Write the E, Z notation of the following compounds.

(a)

(b)

6. Define the absolute configuration of allenes.

7. What is non-classical carbocation?

8. Draw the structure of a secondary carbocation.

9. What is nitration of benzene? Give an example.

10. What is addition reaction?

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).
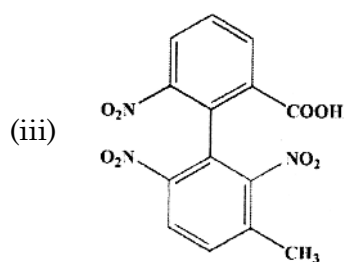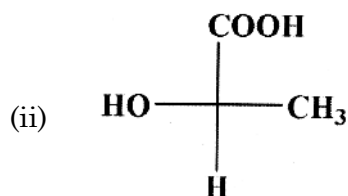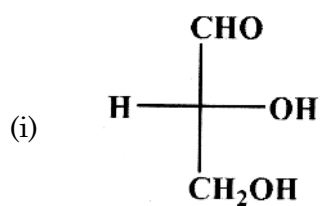
11. (a) Explain the concept of homoaromaticity and antiaromaticity.

Or

(b) State and explain hyperconjugation with an example.

12. (a) Explain the various methods involved in the separation of racemic mixture.

Or

2 D–4531

(b)   Give the R, S notation :

(i)

$$CHO$$
$$H \overline{} OH$$
$$CH_2OH$$

(ii)

$$COOH$$
$$HO \overline{} CH_3$$
$$H$$

(iii)

13. (a)   Write the erythro and threo nomenclaure.

Or

(b)   Explain biphenyls and binophthyls.

14. (a)   Give a detailed note on Baeyer – Villiger and Beckmann rearrangements.

Or

(b)   Illustrate with examples neighbouring group participation in nucleophlic substitution reaction.

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15. (a) Write a note on addition and elimination reactions with suitable examples.

Or

(b) Explain the electrophilic substitution of aromatic compounds. Give an example.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. (a) What are bicyclic and polycyclic compounds? Give examples.

(b) Account for the aromaticity of tropolone.

17. (a) Write note on the conformation of cyclohexane.

(b) Draw the most stable conformations of cis-1, 4-dimethylcyclohexane and trans-1, 3-dimethylcyclohexane.

18. Elaborate a note on spiranes and exo-cyclic alkyldenecycloalkanes.

19. (a) Explain any two kinetic and non-kinetic methods of investigating reaction mechanism.

(b) State the Hammond postulate and its significance.

20. (a) Whether halogens are activating or deactivating groups in aromatic electrophilic substitution reactions. Explain.

(b) Write the S_E1 and S_E2 mechanism with any one example.

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DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2024.

First Semester

PHYSICAL CHEMISTRY – I

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours   Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1.   What is the entropy of mixing?

2.   Define the term entropy.

3.   Draw Carnot's cycle and explain.

4.   Write the Zeroth law of thermodynamics.

5.   How do you find the activity of ions in solution?

6.   Define the photoelectric effect.

7.   Why do classical mechanics have an inadequacy?

8.   Write and explain the third order of reactions with an example.

9.   Write the principle of microscopy reversibility.

10. Define explosive reaction with an example.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Derive the conditions of the Maxwell relations.

Or

(b) Differentiate the activity and activity coefficient.

12. (a) Derive the Debye – Huckel limiting law.

Or

(b) Write the applications of any one conductivity measurement method.

13. (a) Write notes on the reaction isotherm and equilibrium constant.

Or

(b) Write notes on the mathematical term of functions and operators.

14. (a) Derive the particle in one-dimensional box.

Or

(b) Write postulates of quantum mechanics.

15. (a) Write notes on the Kinetic isotopic effect.

Or

(b) Derive the Flow complex reaction mechanism.

2   D–4532

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. How is Clausius's inequality derived?

17. What is the Butler-Volmer equation in electrochemistry? Derive it detail mechanism.

18. Derive the Nernst equations in a detailed manner.

19. Discuss in detail the matrices and vectors in quantum chemistry aspects.

20. Discuss the Lindemann and Hinshelwood mechanism.

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DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2024.

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. Write the systematic name of $[Cu(NH_3)_4]$ Cl_2 and $K_2[Ni(CN)_4]$.

2. What is meant by Jahn-Teller effect?

3. Calculate the μ_{eff} for $[CoF_6]^{3-}$.

4. What is meant by radioactive decay?

5. What are the components of nuclei?

6. Define the term threshold energy.

7. Give an example of artificial transmutation.

8. Give a brief note on carbon dating.

9. Write the electronic configuration of Ce and Lu.

10. What is meant by lanthanide contraction?

PART B — (5 × 5 = 25 marks)

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

11. (a) Explain the postulates of valence bond theory.

Or

(b) Illustrate geometrical isomerism in coordination complexes with suitable examples.

12. (a) How liquid drop model explains nuclear fission?

Or

(b) Write a note on nuclear isomerism.

13. (a) Illustrate isotopic dilution analysis.

Or

(b) Describe the applications of radioactivity in carbon dating and agriculture.

14. (a) How will you separate lanthanides by ion-exchange method?

Or

(b) Enumerate the position of lanthanides and actinides in periodic table.

15. (a) State and explain Soddy's law for radioactive decay.

Or

(b) Explain para and dia magnetism in coordination compounds.

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PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. (a) Sketch and explain crystal field splitting in octahedral complexes. (6)

    (b) Calculate CFSE for low spin and high spin d^6 octahedral complexes. (4)

17. Describe the working and applications of Geiger Muller counter.

18. Explain the following:

    (a) Nuclear fission

    (b) Nuclear Spallation

    (c) Cyclotron (4+3+3)

19. Discuss the spectral and magnetic properties of lanthanides and actinides.

20. (a) Give a comparative account of actinides and lanthanides. (6)

    (b) What is spectro chemical series? Mention its importance. (4)

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DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2024.

Second Semester

ORGANIC CHEMISTRY – II

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours   Maximum : 75 marks
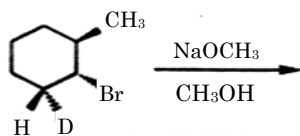
PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What is an elimination reaction? Explain with the help of an example.

2. Provide the structure of the major organic product in the following reaction :

3. What is Michael's reaction?

4. Give the reaction of Claisen condensation.

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

6. Discuss the structure of carbenes.

7. What are the main reactions involving free radicals? Discuss.

8. Which of phenol (a)-(d) is the main product of the following thermal rearrangement?
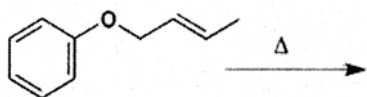
9. Discuss the photochemistry of olefins.

10. Give one example of cope reaction and Claisen reaction.

PART B — (5 × 5 = 25 marks)

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

11. (a) Analyze the reatant(s) and reaction conditions, then predict the structure of the major organic product and indicate the predominant mechanism of each reaction :

(i) $CH_3CH_2CH_2CH_2Br$ $\xrightarrow[\text{(CH}_3)_3\text{COH.82°C}]{K^{\oplus\ominus}OC\ (CH_3)_3}$

(ii)

 $\xrightarrow[\text{(CH}_3)_3\text{COH.82°C}]{K^{\oplus\ominus}OC\ (CH_3)_3}$

(iii)

 $\xrightarrow[\text{CH}_3\text{CH}_2\text{OH.78°C}]{Na^{\oplus\ominus}OCH_2CH_3}$
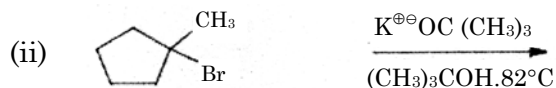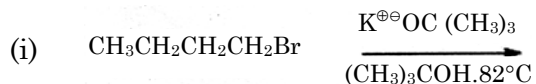
Or

(b) Discuss the stereochemistry of addition reactions.

2 D–4534

12. (a) Draw all the stereoisomers and conformers of 1, 2 ; 1, 3 and 1, 4 – disubtituted cyclohexanes and arrange them in the order of their decreasing stability.

Or

(b) Discuss homotopic ligands and faces.

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

Or

(b) State and illustrate 'Markownikoff's rule' and 'Peroxide effect' taking example of the addition of HBr to propene.

14. (a) Explain the difference between electrocyclic reaction and cycloaddition reaction.

Or

(b) Illustrate the rearrangement with nitrogen as the migration terminus.

15. (a) Discuss the applications of benzoin condesation.

Or

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

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. (a) Explain the free radical reaction with the help of an example.

(b) What do you understand by electrophilic addition? Give examples.

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D–4534

17. (a) Give the electronic mechanism of the following :

    (i) Hydroboration olefins

    (ii) Hydration of olefins

    (iii) Ozonolysis.

    (b) Describe the electronic mechanism of the addition of HCN and $NaHSO_3$ (sodium bisulphite) to the carbonyl group.

18. Write a short notes on the following reactions :

    (a) Barton   (b) Gomberg

    (c) Sandmayer   (d) Ullmann

    (e) Pschorr.

19. (a) Discuss the mechanism of the pericyclic reaction.

    (b) Explain the reactions of the major classes of pericyclic reactions.

20. (a) Draw a Jablonski diagram and explain its mechanism.

    (b) Write a brief note on photochemistry of α, β-unsaturated carbonyl compounds.

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DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2024.

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. Define the term surface excess.

2. What is the Langmuir – Hinshelwood mechanims?

3. What are the types of surfactants and give each one example?

4. What is meant by initiator?

5. What is mean by intersystem crossing?

6. What is mean by photosensitization?

7. Define the quantum yield.

8. What is called fire retardant?

9. Give any two examples of dendrimer.

10. Explain the artificial photosynthesis.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Explain the type of BET isotherms with example.

Or

(b) What are called detergents? Explain their working principles.

12. (a) Write the differences between fluorescence and phosphorescence.

Or

(b) What is called chemiluminescence? Explain with example.

13. (a) What is mean by flash photolysis? Explain its importance.

Or

(b) Write down the radiolysis of water.

14. (a) Explain the classification of polymers.

Or

(b) What is mean by degree of polymerization and explain?

15. (a) Write about the biodegradable polymers.

Or

(b) Write about the principles of dyes sensitized solar cell.

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SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Write about the Freundich and Langmuir types of isotherms with examples. (10)

17. Explain

    (a) Gibbs absorption isotherm. (3)

    (b) Contact angle. (3)

    (c) Explain the hydrogen-halogen reaction. (4)

18. Write about the functionality of monomers and its significance. (10)

19. Write about the mechanism of free radial polymerization. (10)

20. (a) Explain the conducting polymers with example. (5)

    (b) Explain the properties of colloids. (5)

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D–4536

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2024.

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 questions.

1. Define chelate effect.

2. Write notes on Non-complementary reaction with example.

3. Give selection rule for electronic transition in complexes.

4. Define metal clusters with examples.

5. Explain Wade's rule.

6. List out the properties of fluxional molecules.

7. How will you synthesis metal nitrosyls?

8. What is meant by isolobal analogy?

9. Give any two synthetic method of metal carbonyls.

10. Draw the structure of vitamin B_{12}.

PART B — (5 × 5 = 25 marks)

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

11. (a) Explain stability constant and discuss its salient features.

Or

(b) Differentiate isomerisation and racemisation.

12. (a) Write note on 'Tanabe – Sugano diagram'.

Or

(b) Explain : Spinels with examples.

13. (a) Describe briefly about synthesis and structure of acetylene complexes.

Or

(b) Give any two method for the preparation and properties of 'ferrocene'.

14. (a) Discuss elaborately the structure and functions of 'Chlorophyll'.

Or

(b) Illustrate the 'fixation of nitrogen' cycle.

15. (a) Describe in details about Sodium ion pump.

Or

(b) Illustrate the structure and function of Non-heme iron protein.

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D–4536

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Discuss in detail about substitution reaction in square planar complex.

17. Explain the structure and bonding in polyhedral boranes and carborances.

18. List out the Dewar – Chatt approach to bonding in olefins.

19. Outline the catalytic mechanism involved in (a) Hydrogenation reaction and (b) Hydroformylation reaction.

20. Describe the structure and functions of hemoglobin and myoglobin.

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D–4536

D–4537

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2024.

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 questions.

1.   Give the mechanism of Sharpless asymmetric epoxidation.

2.   How do LAH and $NaBH_4$ differ in reactivity?

3.   What is functional group transposition? Give an example.

4.   Give two uses of L- and K- selectrides.

5.   What are chiral boranes? Give two uses.

6.   Write down the structure of atropine and camphor. How many chiral carbons are present in each compound?

7.   Give one method of solid phase protein synthesis.

8.   What do you mean by RNA replication?

9.   What are the sources of vitamin B12, K and E?

10. Differentiate starch and cellulose.

PART B — (5 × 5 = 25 marks)

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

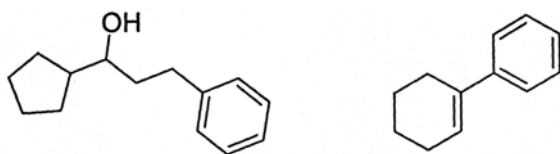11. (a) Explain the structure and synthesis of zingiberene.

Or

(b) How will you determine the primary and secondary structure of proteins?

12. (a) Discuss the mechanism of Corey-Bakshi-Shibata reaction and Wacker oxidation.

Or

(b) Outline the possible retrosynthetic pathway for the following compounds:

13. (a) How will you synthesize flavone and anthocyanin? Give one reactivity for each.

Or

(b) Explain the utility of Os and Ru in oxidation processes.

14. (a) Explain the retrosynthetic pathway of Robinson annulation.

Or

(b) Write notes on the chemistry and physiological action of ascorbic acid and thiamine.

15. (a) Discuss the structural elucidation and synthesis of progesterone.

Or

(b) Explain the mechanism of Birch reduction.

D–4537

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. (a) Write down the mechanism of the following reactions: (3+3)

    (i) Bayer-Villiger oxidation

    (ii) McMurray reduction

    (b) With examples list out the synthetic utilities of the following reagents (2+2)

    (i) TEMPO

    (ii) Wilkinson catalyst

17. (a) Explain the synthesis, and reactivity of indole and oxazole. (3+3)

    (b) Discuss the methods of protecting and deprotecting carbonyl functional group. (4)

18. (a) Write a note on the conformational aspects of disaccharides. (6)

    (b) Elaborate the structural features of RNA and DNA. (4)

19. (a) Illustrate the structural elucidation of cholesterol.(7)

    (b) How are terpenes classified? (3)

20. Explain the structure and synthesis of morphine. (10)

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D–4537

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2024.

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. What is Solvent effect in UV-visible spectroscopy?

2. Illustrate bathochromic and hypsochromic Shift?

3. What is meant by fermiresonance?

4. Define Chemical shift.

5. What is 'g'-value in ESR spectroscopy?

6. Draw cotton effect curves and explain.

7. State Octant rule.

8. Differentiate TGA and DSC.

9. List the applications of flame photometry.

10. Write the principle of Turbidometry.

PART B — (5 × 5 = 25 marks)

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

11. (a) What is the basic principle and factors affecting position of UV-Visible Spectroscopy?

Or

(b) Explain the Woodward-Fieser rules with examples.

12. (a) Illustrate different types of Molecular vibration.

Or

(b) Explain the factors affecting of Vibrational frequency.

13. (a) Explain about the Nuclear Overhauser Effect.

Or

(b) Write short notes on spin-spin coupling.

14. (a) Describe about Mclafferty rearrangement with example.

Or

(b) Determine conformation and configuration using ORD and CD.

15. (a) Write a short note on Nephelometry.

Or

(b) Explain about the Instrumentation and application of Turbidometry?

2 **D–4538**

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain briefly about the basic principle and instrumentation of IR-spectroscopy.

17. Discuss about theory and instrumentation and application of C^{13} NMR Spectroscopy.

18. Describe the following

    (a) Nitrogen rule;

    (b) Meta stable ions;

    (c) Haloketone rule.

19. Illustrate the Principle and application of Thermo Gravimetric Analysis (TGA)?

20. Discuss the principle and instrumentation of flame photometry.

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DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2024.

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 is Random error?

2.   Write short note on Standard deviation.

3.   Give formula for T-test.

4.   Mention the application of electrogravimetry.

5.   What is the principle in Controlled potential coulometry?

6.   Illustrate about Thin layer Chromatography.

7.   List the detector used in Gas chromatography.

8.   List out mas analyzer in GC-MS.

9.   What are the controlling factors of dielectrophoresis?

10. What is the principle involved in reversed phase chromatography?

PART B — (5 × 5 = 25 marks)

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

11. (a) What are the different sources of errors? Explain.

Or

(b) Explain in about least square method.

12. (a) Explain about the correlation coefficient.

Or

(b) Write notes on paper Chromatography.

13. (a) What are the salient features of dropping mercury electrode?

Or

(b) Write a short note on Chronopotentiometry.

14. (a) Discuss the Principle and application of GC-MS.

Or

(b) Explain about the Ion exchange Chromatography.

15. (a) Write note on various application of liquid chromatography.

Or

(b) Write short notes on Electrophoresis.

D–4539

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Discuss the following

    (a) Significant figures;

    (b) Least square method for deriving calibration graph.

17. Describe the following

    (a) Coulometric analysis

    (b) Electrogravimetric analysis

18. Explain about the principle, instrumentation and application of Gas Chromatography.

19. Account the following purification techniques with suitable examples

    (a) Sublimation;

    (b) Solvent extraction; Fractional crystallizaiton.

20. Write a brief note on Cyclic voltammetry?

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D–4539

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2024.

Fourth Semester

APPLIED CHEMISTRY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1.   Write short notes on double layer supercapacitors.

2.   Define preliminary treatment of waste water.

3.   In studying of corrosion process which series are more advantages either EMF or Galvanic? Explain.

4.   What do you mean by corrosion?

5.   What is a current density and current efficiency?

6.   How electroplating differs from electroless plating?

7.   Define electrochemical deposition.

8.   Discuss the principle of TGA?

9.   What are the source of journals?

10. What are the online courses of NPTEL and Swayam?

PART B — (5 × 5 = 25 marks)

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

11. (a) What are the various water treatment methods?

Or

(b) Write short notes on PEM fuel cell system.

12. (a) Draw and explain the Pourbaix diagram with one example.

Or

(b) Describe the electrochemical protection methods for corrosion prevention.

13. (a) What are the various baths used in copper plating?

Or

(b) Explain the principle and applications of alloy plating of brass.

14. (a) Write the physical methods for synthesising nanomaterials.

Or

(b) Discuss the sol-gel thermolysis and combustion methods.

15. (a) Explain the special terms used in Internet with details.

Or

(b) Discuss the online courses of NPTEL, Swayam and MOOC.

D–4540

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. (a) Suggest any three methods to prevent radioactive pollution.

    (b) Explain the electrochemical energy conversion.

17. Discuss the chemical and electrochemical methods used for monitoring corrosion.

18. Briefly explain about the mechanism of electrode position in simple salts and complex salts.

19. Describe the principle, instrumentation and application of AFM.

20. How to calculate bond energy using Born-Lande equation?

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D–4541

DISTANCE EDUCATION

M.Sc. (Chemistry) DEGREE EXAMINATION, MAY 2024.

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 questions.

1. Define the Maxwell-Boltzmann distribution law.

2. State Bose-Einstein distribution law.

3. Define heat capacity of a solid.

4. What is mean by matrix diagonalization?

5. Explain Bjerrum equation.

6. Give an example for molecule with C3v point group.

7. What is the point group of HCHO?

8. Define primary salt effect.

9. What is mean by Edie equation?

10. Explain the Lineweaver-Burke equation.

PART B — (5 × 5 = 25 marks)

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

11. (a) Explain the Entropy and probability.

Or

(b) Explain Maxwell-Boltzmann distribution law with example.

12. (a) Write the Debye's model of heat capacity of solids.

Or

(b) Explain the wave mechanics to simple systems.

13. (a) What is mean by SCF method? Explain its importance?

Or

(b) Write down the HMO method with an example.

14. (a) Explain the symmetry elements and symmetry operations.

Or

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

15. (a) Write about the application of ARRT to solution kinetics.

Or

(b) Write about the secondary salt effect.

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PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Write about the derivation of equilibrium constant from partition function. (10)

17. Explain :

    (a) Non equilibrium thermodynamics. (5)

    (b) Pauli's exclusion principle. (5)

18. Write about the application of perturbation method to He molecule. (10)

19. Write details about the factors influences the reaction rates in solution. (10)

20. (a) Explain the Zucker Hammett hypothesis. (5)

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

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