

F-7392

Sub. Code

7MCH1C1

M.Sc. DEGREE EXAMINATION, APRIL 2022

First Semester

Chemistry

ORGANIC CHEMISTRY - I

(CBCS - 2017 onwards)

Time : 3 Hours

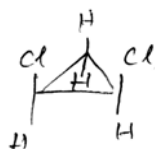
Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. Define Hyper-Conjugation. Explain with one suitable example.
2. Give the Hammett equation and explain the terms involved.
3. Identify the enantiotopic and diastereotopic atoms in the following molecule:



4. State and explain stereoselective reaction with an example.
5. State Huckel's rule. Is cyclopentadienyl anion aromatic? Justify.
6. What are annulenes? Give an example.
7. Comment on the stability of alkyl carbocations.
8. State and explain Hammond postulate.

9. What are ambident substrates? Give an example.
10. Give essential differences between nucleophilicity and basicity.

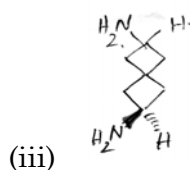
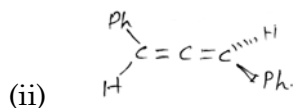
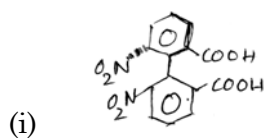
Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

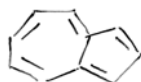
11. (a) With suitable examples, explain the terms homotopic, enantiotopic and diastereotopic groups and faces.

Or

- (b) Assign the absolute configuration 'R' or 'S' to the following compounds. (2+1.5+1.5)



12. (a) Azulene (C₁₀H₈) is a deep blue compound with the structure shown below : Account for its aromaticity and its dipole moment ($\mu = 1.0$ D).



Or

- (b) Define mesoionic compounds. Explain the aromaticity of sydnone.

13. (a) Give order with suitable reason for the stability of the following carbanions:

Cyclopentadienyl, Cyclopentyl, alkyl, benzyl, tertiary butyl and neopentyl.

Or

- (b) What are non-classical carbocations? Discuss their stability.

14. (a) Account for the following (3+2)

(i) The S_N2 substitution of an axial substituent in cyclohexane is faster than that of an equatorial substituent.

(ii) E2 reactions are predominantly anti-eliminations.

Or

- (b) (i) Write a short note on pyrolytic-cis-elimination.
(ii) State and explain Bredt's rule with an example. (3+2)

15. (a) Briefly describe the limitations and modification in Hammett equation.

Or

- (b) Write brief notes on inductive and field effects.

Part C (3 × 10 = 30)

Answer any **three** questions.

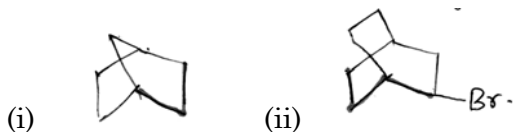
16. Answer the following:

(a) Explain why debromination of meso-2,3-dibromobutane gives trans-2-butene and is faster than debromination of (±) 2,3 dibromobutane which gives cis-2-butene?

(b) Discuss the application of Chiral auxiliaries in asymmetric synthesis.

(c) Discuss optical activity of allenes. (3+3+4)

17. (a) Explain the stability of cyclopropylmethyl carbocations.
- (b) Explain with mechanism, the reactions involving singlet and triplet carbene. (5+5)
18. Explain the following with suitable examples.
- (a) Neighbouring group participation by σ and π electrons.
- (b) Nucleophilic substitution at allylic carbon.
- (c) S_Ni mechanism. (4+3+3)
19. Write short notes on :
- (a) Taft equation.
- (b) Hyper conjugation
- (c) Steric inhibition of resonance. (4+3+3)
20. (a) Write short notes on :
- (i) Craig's rule
- (ii) Alterant and non alterant hydrocarbon. (3+3)
- (b) Give the IUPAC name of the following compounds.(4)



F-7393

Sub. Code

7MCH1C2

M.Sc. DEGREE EXAMINATION, APRIL 2022

First Semester

Chemistry

INORGANIC CHEMISTRY — I

(CBCS – 2017 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. Distinguish between electron affinity and electronegativity.
2. Calculate the effective nuclear charge of the $3s^1$ electron in the sodium atom ($Z = 11$).
3. Predict the geometry of NH_3 using hybridization.
4. Calculate the bond order of CO molecule.
5. The alkali metal in liq. Ammonia solution has blue color. Why?
6. Write conjugate base of NH_3 and H_2O .
7. Mention the applications of silanes.
8. What are phosphazenes? Draw the structure of cyclic trimer and cyclic tetramer.

9. What is the condition for superconductivity? How are they classified?
10. What are molecular solids? Give examples.

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) What is hydrogen bond? Mention its types and applications.

Or

- (b) Discuss Born Haber's cycle of determining lattice energy.

12. (a) Using Hybridization theory, deduce the geometry of XeOF_4 and IF_5 .

Or

- (b) B_2 molecule is paramagnetic whereas C_2 molecule is diamagnetic. Explain.

13. (a) Discuss the factors affecting the strength of acids and bases.

Or

- (b) Explain the any five properties of ionizing solvents.

14. (a) Discuss the preparation and uses of polymeric sulphur nitride.

Or

- (b) Illustrate the chemistry of silicon nitride.

15. (a) Explain with suitable diagrams the different types of solids.

Or

- (b) Discuss the free electron theory of solids.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the following :
- (a) Many salts of lithium and magnesium are soluble in organic solvents
 - (b) Beryllium chloride is soluble in benzene
 - (c) H₂S is a gas whereas H₂O is a high boiling liquid. (3+4+3)
17. Discuss the bond order and magnetic character of carbon dioxide molecule based on MO theory.
18. What are protic and aprotic solvents? Discuss the various reactions occurred in liq. HF.
19. Discuss the preparation, properties and uses of
- (a) S₂N₂
 - (b) P₄S₃
 - (c) Borazine. (3+3+4)
20. (a) What is meant by defects in crystal? How are they classified? Give examples.
- (b) Discuss the role of semiconductors in solar energy conversion. (5+5)

F-7396

Sub. Code

7MCH1E2

M.Sc. DEGREE EXAMINATION, APRIL 2022

First Semester

Chemistry

Elective — POLYMER CHEMISTRY

(CBCS – 2017 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** the questions.

1. Define the term polymers.
2. What is graft polymers?
3. Give any two properties of polystyrene.
4. Mention the uses of polyamides.
5. Explain the following polymers
 - (a) Isotactic and
 - (b) Atactic.
6. What is glass transition temperature?
7. What is solution polymerisation technique? Give an example.
8. What is meant by photostabilizers? Give an example.
9. Explain the term plasticizers.
10. Give the use of polymer used in artificial heart.

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the classification of polymers.

Or

- (b) Discuss the mechanism of free radical polymerization.

12. (a) Give the preparation and properties of polybutadienes.

Or

- (b) List out the properties and uses of poly carbonates.

13. (a) Explain the relationship between glass transition temperature and molecular weight.

Or

- (b) What is poly-dispersity? Explain the molecular weight distribution in polymers.

14. (a) Describe the emulsion polymerisation technique with suitable example.

Or

- (b) Write a note on ultrasonic degradation.

15. (a) Write a note on compression moulding.

Or

- (b) Explain the use of polymer used in

(i) Kidney

(ii) Blood cells.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. (a) Write a note on block polymers
(b) Give the mechanism of ionic polymerisation. (5+5)
17. Write the preparation and properties of the following polymers.
(a) Polytetrafluoroethylene
(b) Urea-formaldehyde. (5+5)
18. (a) Explain number average and weight average molecular weights of polymers.
(b) Write a note on kinetics of polymerization. (6+4)
19. Write short notes on :
(a) Thermal degradation
(b) Antioxidants. (5+5)
20. Discuss the following polymer processing
(a) Calendaring
(b) Die casting. (5+5)
-

F-7397

Sub. Code

7MCH2C1

M.Sc. DEGREE EXAMINATION, APRIL 2022.

Second Semester

Chemistry

ORGANIC CHEMISTRY-II

(CBCS – 2017 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. Define Eliel -Rho equation. Explain the terms involved.
2. Draw the stable conformation of 1,2-disubstituted cyclohexane. Give reason.
3. According to Woodward rules, mention the increment in wavelength for pi bond extending conjugation and exocyclic double bond.
4. What are metastable ions? Give one suitable example.
5. What do you mean by coupling constant? Give one example.
6. Give one example that explains spin-spin relaxation time in C-13 NMR spectroscopy.

7. Predict the products of Birch reduction on benzoic acid and Justify.
8. Mention the role of umpolung reagent (1,3-dithiane) in organic synthesis.
9. Mention any two role of progesterone.
10. What are A/B-trans steroids? Give one example.

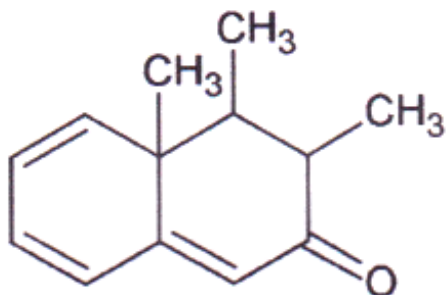
Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Depict the chair-chair inter-conversion in cyclohexane with a neat sketch.

Or

- (b) Draw the most stable conformation of ethylene-glycol in Newmann projection and justify.
12. (a) Calculate the λ max for the following compound by UV spectroscopy:



Or

- (b) Briefly explain the principle of Mass spectroscopy with a neat sketch.

13. (a) Explain the role of shift reagents in simplification of complex proton NMR spectra.

Or

- (b) Discuss the following:
- (i) Chemical shift
 - (ii) equivalent and non-equivalent protons (3+2)
14. (a) Describe in detail Oppenauer oxidation with mechanism.

Or

- (b) Describe with mechanism, homogeneous and heterogeneous catalytic reduction with one suitable example each.
15. (a) Describe the synthesis of ergosterol in detail.

Or

- (b) Briefly discuss the functions of androsterone and testosterone.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. What is meant by conformational energy? How to determine conformational energy difference? Give in detail conformational analysis of cyclohexane.
17. Discuss the factors influencing group frequencies in IR spectrum. Briefly describe the IR spectra of cinnamic acid.

18. Explain the following:
- (a) Off-resonance decoupling
 - (b) 2D NMR (HOMOCOR AND HETCOR) (5+5)
19. Briefly discuss with mechanism for the following:
- (a) Oxidation reactions involving chromic acid and osmium tetroxide.
 - (b) Role of crown ethers and quaternary ammonium salt as phase transfer catalyst in organic synthesis. (5+5)
20. Briefly describe the chemistry and stereochemistry of cholesterol.
-

F-7398

Sub. Code

7MCH2C2

M.Sc. DEGREE EXAMINATION, APRIL 2022.

Second Semester

Chemistry

INORGANIC CHEMISTRY-II

(CBCS – 2017 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. Write the formulae for the following:
 - (a) tris(ethylenediamine)rhodium(III) ion and
 - (b) μ -hydroxo-bis[pentamminechromium(III)] chloride
2. Cyano and nitro metal complexes have high Δ_0 values. Explain.
3. What is meant by acid hydrolysis reaction?
4. *cis-effect* is not generally observed in the reaction of metal complexes. why?
5. Write down the structures of any two synthetic oxygen carriers
6. Why does myoglobin bind oxygen more tightly than hemoglobin?
7. Write the conditions to be satisfied by a metal to act as catalyst

8. What is meant by insertion reaction?
9. Distinguish between artificial and induced radioactivity.
10. Calculate the number of alpha and beta particles emitted in the conversion from $^{232}\text{Th}_{90}$ to $^{208}\text{Pb}_{82}$.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Using CFT, explain the spinel and inverse spinel structures of the mixed metal oxides.

Or

- (b) Give the relationship between overall and stepwise stability constants? How is stability constant determined by Spectrophotometric method?

12. (a) Explain S_N^iCB reaction with suitable examples

Or

- (b) Discuss inner and outer sphere electron transfer reactions with suitable examples

13. (a) Compare the structures of haemoglobin and myoglobin

Or

- (b) Explain the function of chlorophyll.

14. (a) Discuss the mechanism of hydrogenation of olefins.

Or

- (b) Explain the mechanism of hydroformylation of olefins using Rhodium complex as catalyst

15. (a) What is breeder reactor? Mention its types? Explain the function of fast breeder reactor.

Or

- (b) Distinguish between Nuclear fission and nuclear fusion.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. (a) Discuss the VB theory to explain the magnetic behavior of metal complexes.
(b) Explain why Cu^{2+} does not form a regular octahedral complex whereas Ni^{2+} does? (5+5)
17. (a) Using the electron transfer reactions, synthesize any two six coordinated metal complexes
(b) Enumerate the applications of trans-effect series in the preparation of Pt(II) complexes (5+5)
18. (a) Describe the Perutz mechanism of low spin and high spin "trigger" in hemoglobin system
(b) Explain the characteristics of nitrogenase enzyme (5+5)
19. Bring out the importance of
(a) copper in oxidation of alkene to aldehyde
(b) Ni salts in oligomerization of acetylene reaction (5+5)
20. (a) Write a note on stellar energy.
(b) Discuss the applications of radioactive isotopes in medicine and agricultural fields. (4+6)

F-7399

Sub. Code

7MCH2C3

M.Sc. DEGREE EXAMINATION, APRIL 2022

Second Semester

Chemistry

PHYSICAL CHEMISTRY – II

(CBCS – 2017 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. What are the assumptions of collision theory?
2. State and explain Lindemann's hypothesis.
3. What is Einstein coefficient?
4. What is the important criteria for a molecule to be IR active?
5. Which of the following molecules N₂ and O₂, will show an ESR spectrum? Explain.
6. Explain what is meant by dipolar interaction in NMR spectroscopy.
7. Explain chemical shift in ESCA.
8. State Franck Condon principle.
9. State the criteria for elements to form a group.
10. What are irreducible representations?

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Give thermodynamic treatment to ARRT equation.

Or

- (b) Discuss the theory of explosion reactions and explain the causes for the explosion limits of H₂-O₂ reaction.

12. (a) Discuss the effect of isotopic substitution in IR spectroscopy.

Or

- (b) Write a note on fermi resonance.

13. (a) Discuss how NQR is used to study hybridisation and ionic character of the bond.

Or

- (b) Explain the use of lanthanide shift reagents in NMR spectroscopy.

14. (a) Give a concise account of Fortrat diagram.

Or

- (b) Discuss the quantum theory of Raman scattering.

15. (a) How would you systematically proceed to find out the point group of a molecule.

Or

- (b) Construct the character table for C_{3v} point group.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. (a) Discuss the RRKM treatment of unimolecular reactions.
- (b) Discuss the mechanism and kinetic features of decomposition of N₂O₅. (5 + 5)
17. (a) Explain the origin, selection rule and applications of microwave spectroscopy.
- (b) Describe the basic principles of FT-IR spectroscopy. (5 + 5)
18. (a) Write a note on chemical shift and relaxation time.
- (b) Discuss the factors affecting the 'g' value in ESR spectrum. (5 + 5)
19. (a) Describe the rotational fine structure of electronic spectra.
- (b) Discuss the salient features of UV photoelectron spectroscopy. (5 + 5)
20. (a) State and explain The Great Orthogonality theorem.
- (b) Using group theory discuss the type of hybridisation that exist in BF₃ molecule. (6 + 4)
-

F-7400

Sub. Code

7MCH2E1

M.Sc. DEGREE EXAMINATION, APRIL 2022

Second Semester

Chemistry

Elective — ENVIRONMENTAL CHEMISTRY

(CBCS – 2017 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. What is global warming?
2. Write the causes of acid rain.
3. Define : Fluorosis.
4. What is eutrophication?
5. Give a short note on soil profile.
6. What is soil pollution?
7. Write any two effects of ionizing radiation on man.
8. Give any two biochemical effects of lead.
9. What is Tsunami?
10. How does earthquake occur?

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the hydrological cycle in detail.

Or

- (b) Describe the carbon cycle in the environment.

12. (a) Discuss the different water pollutants with examples.

Or

- (b) Describe the different standards and parameters used in checking water quality.

13. (a) Provide the note on micro and macronutrients in soil and their role.

Or

- (b) Explain how plants can indicate the soil pollution.

14. (a) Discuss about the protection and control from radioactive pollution.

Or

- (b) Write a detailed note on pollution caused by pulp and paper industries.

15. (a) Provide a note on disaster prevention.

Or

- (b) Discuss the nuclear accidents happened in world.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. (a) Write a note on the classification of pollutants.

- (b) Provide the details about the effects and controlling air pollutants. (5 + 5)

17. (a) Compare the various water resources and their characteristics.
(b) Discuss various water treatment processes and preservation. (5 + 5)
18. (a) Write in detail about the soil analysis.
(b) Provide the note on treatment of soil pollution. (5 + 5)
19. (a) Write a note on chemical solutions to biodegradability.
(b) Discuss the Bhopal gas tragedy. (6 + 4)
20. Provide a detailed note on cyclone, its formation and its types.
-

F-7405

Sub. Code

7MCH4C1

M.Sc. DEGREE EXAMINATION, APRIL 2022.

Fourth Semester

Chemistry

INSTRUMENTAL METHODS OF ANALYSIS

(CBCS – 2017 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** the questions.

1. A metal determination is having a standard deviation of 4.2 mg. If the sample is having a mean value of 42 mg of copper, calculate the variance.
2. If a student measured the room width at 8.46 m and the accepted value was 9.45 m. What was their accuracy?
3. What is meant by precipitation reaction? Give example
4. Define nucleation process
5. What is limiting current?
6. Why do we use three electrodes in voltammetry techniques?
7. Draw a thermogram of copper sulphate pentahydrate.
8. What is meant by dynamic TGA? How does it differ from static TGA?

9. What general principles should be used when choosing a filter for a colorimetric investigation?
10. Mention the principle of turbidimetry.

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Define correlation and regression. Discuss the method of least square to fit the set of data.

Or

- (b) Explain the rules to be followed for computing the significant figures? Obtain the results with the significant figures: $2.5 + 356 - 63.2 + 6.335$.

12. (a) What is precipitating agent? How are they classified? Give examples.

Or

- (b) Discuss the applications of gravimetric methods.

13. (a) Explain the principle and working of coulometry.

Or

- (b) Explain what is meant by adsorptive (or cathodic stripping voltammetry) and explain the principles behind it.

14. (a) Discuss the factors affecting the TG curves.

Or

- (b) Explain thermal behavior of calcium oxalate monohydrate.

15. (a) Briefly discuss the basis and applications of Turbidimetry.

Or

- (b) What is Beer's and Lambert's law? What are the conditions for a satisfactory colorimetric analysis?

Part C (3 × 10 = 30)

Answer any **three** questions.

16. (a) How are errors classified? Explain with suitable examples.
- (b) Explain student's 't' test to compare the precision of two methods. (5+5)
17. (a) Distinguish between co-precipitation and post-precipitation.
- (b) Write a note on precipitation from homogeneous solution. (5+5)
18. Explain the principle of electrogravimetry. How is it useful in determining the amount of metal ion in the presence of another metal? How does it differ from gravimetry?
19. Make a detailed comparison of the techniques of differential thermal analysis (DTA) and differential scanning calorimetry (DSC) and discuss the relative advantages and disadvantages of the techniques.
20. (a) Determine the amount of iron using colorimetric method.
- (b) Describe the principle and applications of flame photometry. (5+5)

F-7406

Sub. Code

7MCH4E1

M.Sc. DEGREE EXAMINATION, APRIL 2022.

Fourth Semester

Chemistry

Elective: NANOCHEMISTRY

(CBCS – 2017 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. What is meant by Surface Plasmon Resonance?
2. Define hydrodynamic cavitation.
3. How carbon nanotubes are advantageous over graphite?
4. What are nanofibers? Give example.
5. What are larger and smaller fullerenes?
6. Give a preparation of nano CdO.
7. Give the working principle of Scanning Tunneling Microscopy.
8. Define Auger effect.
9. What are nanopipettes?
10. What are DNA junctions?

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write a note on unique properties due to nanosize.

Or

- (b) Explain the sol-gel method of synthesis of nanoparticles.

12. (a) What are semiconductor quantum dots? Explain with example.

Or

- (b) Describe the applications of nanomaterials in energy.

13. (a) Write a note on Rotaxanes.

Or

- (b) Write a note on discovery of C₆₀ and doped C₆₀.

14. (a) Give the principles and applications of Scanning Electron Microscopy (SEM).

Or

- (b) Discuss the principles and applications of atomic force microscopy (AFM).

15. (a) Give a brief account of nanoparticles mediated transfection.

Or

- (b) Write short notes on the DNA as nanomaterials.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Explain

(a) Synthesis of nanoparticles using microorganisms

(b) Microwave assisted synthesis of nanomaterials.

(5+5)

17. (a) Discuss the applications of nanomaterials in medicine and defense.

(b) Write notes on graphenes.

(6+4)

18. (a) Discuss the preparation properties and uses of TiO₂ nanomaterials.

(b) Give an account of C₆₀ superconductivity.

(5+5)

19. (a) Give the principles and applications of Transmission Electron Microscopy.

(b) Describe the principles and applications of X-ray diffraction.

(5+5)

20. (a) What are DNA knots?

(b) Give an account of Molecular recognition and DNA based sensors.

(4+6)

F-7407

Sub. Code

7MCH4E2

M.Sc. DEGREE EXAMINATION, APRIL 2022

Fourth Semester

Chemistry

Elective : CORROSION CHEMISTRY

(CBCS – 2017 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. What is Galvanic series?
2. Define the term electrochemical corrosion.
3. What are inter-granular corrosion? Give an example.
4. Define the term Galvanic corrosion.
5. What is cementation?
6. Define the term paint.
7. What are electrochemical energy conversion?
8. Define Power density.
9. List out the advantages of fuel cells.
10. What is electrocatalysis of oxygen reduction?

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the theory of electrochemical corrosion.

Or

- (b) Write the corrosion control methods.

12. (a) Discuss the following :

(i) Waterline corrosion.

(ii) Stress corrosion.

Or

- (b) Explain the corrosion failure due to activity of micro-organisms.

13. (a) Discuss the various types of electroplating.

Or

- (b) Write short notes on Oxide Coating.

14. (a) Explain the criteria for selection of anodes and cathodes.

Or

- (b) Describe the different types of primary cells.

15. (a) What are fuel cells? Explain the H₂ – O₂ fuel cells.

Or

- (b) Write a note on Mercury porosimetry.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. (a) Write a note on Dry corrosion.
(b) What are the factors influencing the corrosion? (5 + 5)
17. (a) Define atmospheric corrosion. Explain the factors influencing atmospheric corrosion.
(b) Write a note on Microbiological corrosion. (5 + 5)
18. (a) What is protective coatings? Explain the classification of protective coatings. (6)
(b) Write a note on Phosphate coating. (4)
19. What is electrolytes? Explain the aques, molten salt and solid electrolytes.
20. Discuss the following:
(a) Phosphoric acid fuel cell system.
(b) Molten carbonate fuel cell system. (5 + 5)

F-7408

Sub. Code

7MCH4E3

M.Sc. DEGREE EXAMINATION, APRIL 2022.

Fourth Semester

Chemistry

Elective: GREEN CHEMISTRY

(CBCS – 2017 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. What is eco- efficiency?
2. Define the term green chemistry.
3. Define atom economy.
4. What are inception of green chemistry?
5. Give any one method of removing arsenic in water
6. List out the health impacts of thallium.
7. Write down the Benzoin condensation reaction in water.
8. What are super critical polymerization?
9. Define the term sono chemistry?
10. What are phase transfer catalysts?

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Discuss the need for the green chemistry.

Or

- (b) Explain the green chemistry innovation for a cleaner world.

12. (a) Write the concept of atom economy taking rearrangement reaction as an example.

Or

- (b) Write a note on inception of green chemistry.

13. (a) Explain any one method of removing the following heavy metals in water.

(i) Cadmium

(ii) Beryllium

Or

- (b) Write the health impacts of following metals

(i) Manganese

(ii) Cobalt

14. (a) Explain the Suzuki and Waker- type oxidation reactions by using ionic liquids.

Or

- (b) Write a critical note on the choice of reagents in designing a green synthesis.

15. (a) Discuss the following
- (i) Microwave activation
 - (ii) Microwave heating
- Or
- (b) Explain the Curtius rearrangement and Hydroboration.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Write the major environmental laws and mention their significance.
17. Write down any ten principles of green chemistry.
18. (a) Discuss any two methods of removing the uranium heavy metal in water.
- (b) Give the health impacts of the following metals
- (i) Lead
 - (ii) Tellurium (5+5)
19. (a) Explain the Claisen rearrangement by using water (4)
- (b) Write short notes on
- (i) Kolbe-Schmitt synthesis
 - (ii) Friedel-Crafts reaction (6)
20. (a) Explain the role of microwave assisted reactions in water with two examples.
- (b) Write a note on polymer supported catalysts. (5+5)

F-7409

Sub. Code

7MCH4E4

M.Sc. DEGREE EXAMINATION, APRIL 2022

Fourth Semester

Chemistry

Elective : MOLECULAR PHOTOCHEMISTRY

(CBCS – 2017 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. What is meant by symmetry forbidden transitions?
2. Define phosphorescence.
3. How would you know, a Fluorescence quenching process is dynamic or static in nature?
4. Define photochemical oxidation.
5. Explain photoredox reaction.
6. What is photochemical conversion?
7. Give example for photo cleavages.
8. What is photoaddition reaction?
9. Mention the limitations of monochromators.
10. Write the uses of actionometers.

Part B

(5 × 5 = 25)

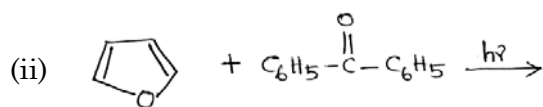
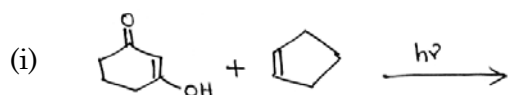
Answer **all** questions, choosing either (a) or (b).

11. (a) Explain photosensitisation with suitable examples.

Or

- (b) Write a note on internal conversion and inter system crossing.

12. (a) Complete the following cycloaddition reactions with mechanism.



Or

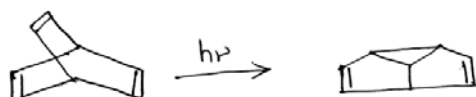
- (b) Give an account on oxetane formation.

13. (a) Give an account on photochemistry of metallocenes.

Or

- (b) Explain photo rearrangement reaction.

14. (a) Provide mechanistic rationalisation for the following reaction.



Or

- (b) Explain photoisomerisation in alkene compounds.

15. (a) Write the working principle of chemical actinometer.

Or

- (b) Explain the working and properties of Reinecke's salt actinometer.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Describe the different photophysical and photochemical processes of the electronically excited states.
17. (a) State and explain Woodward - Hoffmann rule. (5)
(b) Discuss the mechanism of photochemical reduction. (5)
18. Write notes on (5+5)
(a) Photochemistry of transition metal complexes.
(b) Storage of solar energy using transition metal complexes.
19. (a) Give the mechanism of Barton reaction. (3)
(b) Explain photonucleophilic and photoelectrophilic substitution. (7)
20. Discuss laser and its applications.