

UNICE BASED CREDIT SYSTEM SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2019

M.Sc. CHEMISTRY

PHYSICAL CHEMISTRY THEORY - II

Time: 3 Hrs

Max. Marks: 70

PART - A

1) Answer any TEN of the following:

(2×10=20)

- a) Distinguish between eutectic point and peritectic point using suitable examples.
- b) How does Gibbs free energy affect the catalytic activity of a reaction?
- c) List out the characteristics of eutectic mixtures.
- d) State Wein's effect.
- e) Why surfactants exhibit abnormal behaviour in their physical properties at critical micellar concentration?
- f) What are the differences between catalytic fouling and catalytic poisoning? Give one example for each.
- g) Account on the physical significance of Gibb's adsorption isotherm.
- h) Write any two differences between Freundlich and Langmuir adsorption isotherms.
- i) Mention the characteristics of chemisorption process.
- j) State Franck-Condon principle.
- k) What are the photosensitizers used in the following reactions:
i) Maleic acid to fumaric acid. ii) polymerisation of ethylene.
- l) Why the quantum yield for the photochemical reaction of hydrogen (H₂) and chlorine (Cl₂) is very high?

PART B

Answer any FIVE questions selecting any ONE question from each unit

(10×5=50)

UNIT - I

- 2) a) Draw and explain the phase diagram of three-component system constituting two pair partially miscible liquids.
b) Discuss in detail the effect of pH on the reaction rate of acid-base catalysed reactions. (6+4)
- 3) a) Draw a temperature composition phase diagram for a binary system AB having Cryohydric point.
b) How does catalytic coefficients are used to measure the effectiveness of any acid base catalyst? Explain. (6+4)

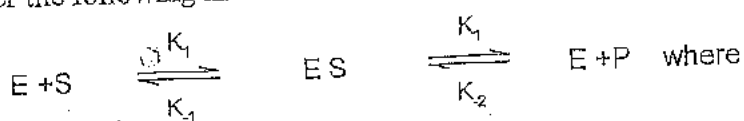
UNIT - II

- 4) a) Write an account on the solubilization of surfactant solutions?
b) How does the size and shape of catalysts affect the reaction rate? (4+6)

- 5) a) What is meant by catalytic deactivation? Describe different methods of catalytic deactivation?
 b) Evaluate the role of promoters and stabilisers in the preparation of catalyst. (6+4)

UNIT - III

- 6) a) Explain unimolecular and bimolecular surface reactions.
 b) Determine surface area and pore size of an adsorbent using Gibbs adsorption isotherms. (6+4)
- 7) a) Describe the effect of temperature and pH on enzyme catalysis.
 b) Consider the following mechanism for an enzyme catalysis.



E stands for enzyme, S for substrate, ES for Enzyme - substrate complex and P for product. Applying steady state approximation for [ES], derive the rate law for the formation of the product during the initial stages. (4+6)

UNIT - IV

- 8) a) Describe the stopped flow method to study photochemical reactions.
 b) What is chemiluminescence? Discuss its mechanism in anion-cation reactions. (6+4)
- 9) a) Deduce an equation relating fluorescence intensity and concentration.
 b) Illustrate and explain photosensitization reactions sensitized by mercury atoms. (5+5)

Time: 3 Hrs

PART - A

I Answer any SEVEN of the following:

(2×7=14)

- a) Give a method of preparation of benzylacetate. Write its importance.
- b) What is Rancidity?
- c) What are Acidulants? Give examples.
- d) Give an example each for anionic and cationic detergents.
- e) What are the constitutions of varnishes?
- f) Give the formulations of toothpaste.
- g) Distinguish between aldoses and ketoses.
- h) How are Vitamins classified?
- i) Explain saponification reaction of lipids.

PART B

Answer any FOUR questions selecting any ONE question from each unit

(14×4=56)

UNIT - I

- 2)
 - a) Outline the methods of preparation and importance of phenyl acetic acid and musk xylene.
 - b) Write briefly about natural flavouring materials and their classification
 - c) Write a note on organic chemicals employed in flavourings and food colourants. (5+4+5)
- 3)
 - a) Describe the methods of preparation and importance of musk ambrette and phenyl ethanol.
 - b) Explain the classification of flavours and chemical basis for flavour. (5+4+5)
 - c) Write a note on: sweeteners, potentiators and enhancers.

UNIT - II

- 4)
 - a) Describe manufacture of soaps.
 - b) Explain the manufacture of fatty acids.
 - c) Give the detailed study of formulations and manufacturing of cream and lotions. (5+4+5)
- 5)
 - a) Write a note on preparation and applications of paints and inks.
 - b) Compare soaps and detergents. Give examples for detergent builders.
 - c) Give a detailed study of formulations and manufacturing of lipstick and shampoos. (5+4+5)

UNIT - III

- 6) a) Write a note on oligosaccharides.
b) Give an elementary idea of amino acids, peptide bond, polypeptides and proteins.
c) What are lipids? How are they classified?

(5+4)

- 7) a) Explain the classification of carbohydrates.
b) Write briefly on Vitamins deficiency manifestation.
c) Discuss the classification and functions of Fatty acids.

(4+5)

CHOICE BASED CREDIT SYSTEM SECOND SEMESTER M.Sc. DEGREE EXAMINATION APRIL 2019

M.Sc. CHEMISTRY

ORGANIC CHEMISTRY THEORY - II

Time: 3 Hrs

Max. Marks: 70

PART - A

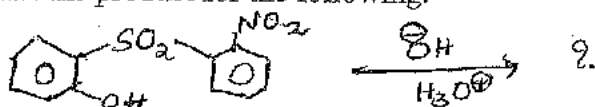
I Answer any TEN of the following:

(2×10=20)

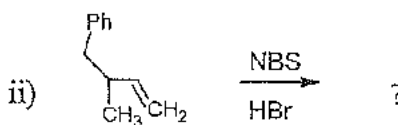
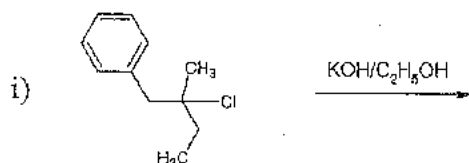
- a) Indicate the rate determining step in electrophilic aromatic substitution reaction taking suitable example.
 b) Account for the following.

"OMe and OH" groups are poor leaving groups.

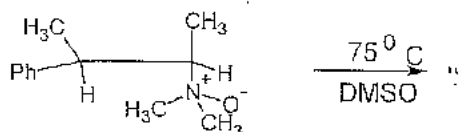
- c) Predict the product for the following.



- d) Suggest the major products in the following reactions.

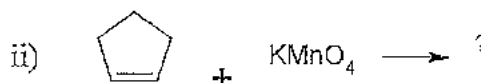


- e) Predict the product in the following reactions and justify that it is stereospecific reactions.



- f) What are the factors that favour
- α
- elimination reactions?

- g) Predict the products in the following reactions.



- h) Explain the mechanism of Transesterification.

- i) Base catalysed hydrolysis of ester proceeds via acyl oxygen bond cleavage. Justify.

- j) Suggest a method for the conversion of epoxide into episulfide.

- k) Among thiophene and furan, which is more aromatic? Justify?

- l) Give one reaction of pyrimidine with nucleophilic reagents. Explain the mechanism.

PART B

Answer any FIVE of the following, selecting any ONE question from each unit (10×5=50)

UNIT - I

- 2) a) Justify that the nature of solvent, incoming nucleophile and leaving group plays an important role in nucleophilic substitution reaction. (5+5)
b) Show that S_N2 reactions are stereoselective and stereospecific.
- 3) a) How participation of neighbouring groups can influence the course of nucleophilic substitution reaction. Explain with suitable example.
b) Discuss the mechanism of Friedel - Craft's reaction and explain why this reaction cannot be carried out with nitrobenzene, aniline and phenol. (5+5)

UNIT - II

- 4) a) What different structural features can help in stabilizing free radicals? (4+6)
b) How Saytzeff and Hofmann rules are justified? Discuss their limitations.
- 5) a) Explain the mechanistic path of E1 elimination. Predict the products of reaction between t-butyl bromide and ethanol.
b) Explain the following. (5+5)
i) E1cB eliminations are least common (ii) Chugaev reaction.

UNIT - III

- 6) a) How can you explain the stereochemistry of electrophilic addition with special reference to addition of bromine to alkene?
b) Illustrate the mechanism of the following: (5+5)
i) Reformatsky reaction ii) Wittig reaction
- 7) a) Discuss the mechanism of Michael addition. Give one synthetic application of it.
b) Write short note on (5+5)
i) Aldol condensation ii) Acid catalysed bimolecular acyl-oxygen cleavage hydrolysis of esters.

UNIT - IV

- 8) a) Discuss the electrophilic substitution reactions of Furan. (5+5)
b) Outline the synthesis of aziridine and pyrazole.
- 9) a) Explain Fischer - Indole synthesis. Outline its mechanism.
b) Discuss the reactions of pyridines with nucleophilic reagents, oxidising and reducing agents. (5+5)

CHOICE BASED CREDIT SYSTEM ~~SECOND~~ SEMESTER M.Sc. DEGREE EXAMINATION APRIL 2019

M.Sc. CHEMISTRY

INORGANIC CHEMISTRY THEORY - II

Time: 3 Hrs

Max. Marks: 70

I Answer any TEN of the following:**(2×10=20)**

- What is inorganic benzene? Why is it known so?
- Justify that graphite is electrically conducting but diamond is not.
- What are silicones? Why are they known as inorganic polymers?
- Justify that reducing properties of hydrides of group 15 elements increase down the group.
- SO₂ is a reducing agent where as TeO₂ is an oxidising agent. Justify?
- Among hydrides of group 16 elements, water is with higher boiling point than expected.
- What are pseudohalides? Give examples.
- Explain an evidence supporting the electropositive character of iodine.
- Justify that xenon hydrate is the most stable hydrate of noble gases.
- Justify that melting point of Zn is the lowest of the 3d series transition elements.
- Justify that magnetic moment of lanthanides do not match with the calculated values from spin only formula.
- What are the possible geometries and corresponding hybridisation for complexes with coordination number 5?

PART B**Answer any FIVE questions selecting any ONE question from each unit.****(10×5=50)****UNIT - I**

- Explain the bonding in diborane.
 - What are intercalate compounds of graphite? Justify that the intercalate compound with fluorine is non conducting.
 - Differentiate the bonding in CO₂ and SiO₂. Justify that CO₂ is a gas but SiO₂ is a solid. (4+3+3)
- Explain the strength of boron halides as Lewis acids with justification.
 - How are graphite and boron nitride are structurally similar and different?
 - Explain the structure of cyclic silicates and mention their representative units. (4+3+3)

UNIT - II

- What are phosphazines? Explain the structure of hexachloro cyclo phosphazene and justify the bond angles in it.
 - Explain the structure of H₂SO₄. Justify that it is a highly viscous liquid.
 - What are per sulphuric acids? Give examples. Why are they known as peroxy acids? (4+3+3)

- 5) a) Explain the variation of donor properties of hydrides of group 15 elements, with justification.
b) Explain the bonding and structure of SO_2 . Justify that Sulfur-oxygen bonds are identical in it.
c) Explain the anomalous properties of : (i) Liquid S (ii) H_2O (3+3+4)

UNIT - III

- 6) a) Compare the strength of halogen hydrides as acids with justifications.
b) Explain the bonding and structure of: (i) IF_5 (ii) FCIO_3
c) How is XeF_6 prepared? Justify that it cannot be stored in glass containers. (3+4+3)
- 7) a) Explain the relative strengths of oxoacids of chlorine with the increase in the number of oxygen atoms.
b) What are interhalogen compounds? Mention the types. Justify that they are more reactive than parent halogens.
c) Explain the structures of: (i) XeF_4 (ii) XeOF_4 (3+4+3)

UNIT - IV

- 8) a) What are transition contraction and lanthanide contraction? Explain their relative magnitudes and consequences.
b) Explain the following properties of d-block elements:
i) Formation of colored compounds (ii) Catalytic properties (6+4)
- 9) a) Explain the following properties of lanthanides:
i) Atomic size (ii) Oxidation states
b) Explain the separation of lanthanide by the following methods:
i) Solvent extraction (ii) Ion exchange method (4+6)
