

SEMESTER-II

	PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A) KAKINADA DEPARTMENT OF CHEMISTRY	Program & Semester I B.Sc. Chemistry (Honours) (II Semester)			
Course Code CHE-3	TITLE OF THE COURSE MAJOR 3: ORGANIC CHEMISTRY-1				
Teaching	Hours Allocated: 45 (Theory)	L	T	P	C
Pre-requisites	Basic concepts of alkanes, alkenes and alkynes, reactions and stereochemistry	45	10	30	3+1

Course Outcomes:

On Completion of the course, the students will be able to	
CO1	Study Inductive effect, Mesomeric effect, Hyperconjugation and its applications
CO2	Explain the preparation and chemical properties of alkanes, alkenes, alkynes and benzene
CO3	Analyse and apply Huckel's rule to benzenoid and non-benzenoid aromatic compounds.
CO4	Differentiate between Markownikoff and Anti-Markownikoff addition, Ring activating and deactivating groups.
CO5	Interpret stereochemical representations and identify chiral molecules.

Syllabus:

UNIT-I : STRUCTURAL THEORY IN ORGANIC CHEMISTRY (9 Hrs.)

Functional groups in organic chemistry, Types of bond fission, Electrophiles, Nucleophiles, Reactive intermediates-carbocations, carbanions & free radicals. Inductive effect and its application: (a) Basicity of amines and (b) Acidity of carboxylic acids, Resonance or Mesomeric effect and its application: (a) Acidity of phenol, and (b) Acidity of carboxylic acids. Hyper conjugation and its application to the stability of carbonium ions..

UNIT-II SATURATED HYDROCARBONS (ALKANES & CYCLO ALKANES) (9 Hrs.)

Types of organic reactions: Addition, Elimination, Substitution and Rearrangement reactions.

Alkanes: Preparation of alkanes by Corey House synthesis, Substitution reactions of alkanes.

Cycloalkanes: Cycloalkanes and their relative stability, Baeyer strain theory, Cyclohexane conformations with energy diagram.

UNIT-III UNSATURATED HYDROCARBONS (ALKENES & ALKYNES) (9 Hrs.)

Alkenes: Preparation of alkenes by dehydration of alcohols, Saytzeff and Hofmann eliminations, Electrophilic Additions of X₂, H₂O, HX to alkene, Markownikoff and Anti-Markownikoff addition, Ozonolysis, Diels-Alder reaction, 1,2- and 1,4-addition reactions in conjugated dienes.

Alkynes: Additions of X₂, H₂O, HX to alkynes, acidity and alkylation of terminal alkynes.

UNIT-IV: AROMATICITY, BENZENE AND ITS REACTIVITY**(9 Hrs.)**

Aromaticity: Concept of aromaticity, Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non-Benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation). Electrophilic aromatic substitution benzene- Halogenation, Nitration, Friedel-Craft's alkylation and Friedel- Craft's acylation.

Orientation of aromatic substitution: Ortho, para and meta directing groups with examples, Ring activating and deactivating groups with examples.

UNIT-V: STEREOCHEMISTRY OF CARBON COMPOUNDS**(9 Hrs)**

Molecular representations - Wedge, Fischer, Newman and Saw-Horse formulae.

Optical Isomerism: Optical activity, optical rotation and specific rotation. Chiral molecules, Symmetry elements-enantiomers and diastereomers. Explanation of optical isomerism with examples- Glyceraldehyde, Lactic acid, and Tartaric acid. Relative configuration (D, L-notation), CIP rules, Absolute configuration (R, S-Configuration)

Textbooks:

S.NO	AUTHOR	TITLE	PUBLISHER
1	R.N. Morrison, R.N. Boyd	Organic Chemistry,	Pearson Education,
2	P.Y. Bruice,	Organic Chemistry	Pearson Education,

Reference books

S.NO	AUTHOR	TITLE	PUBLISHER
1	Peter Sykes,	Guidebook to Mechanism in Organic Chemistry	New Age International
2	P.S. Kalsi,	Stereochemistry	New Age International

WebLinks:

1. https://www.youtube.com/results?search_query=structural+theory+organic+chemistry+functional+groups+lecture
2. https://www.iptsalipur.org/wp-content/uploads/2020/08/BP301T_POC_UNIT_V.pdf
3. https://www.youtube.com/watch?v=hsNBoq_EoKk
4. [https://copbela.org/downloads/2022/SELF%20LEARNING%20MATERIAL%20BPHARMA/Module 3/semster-3/BP301T/BP301T-1.pdf](https://copbela.org/downloads/2022/SELF%20LEARNING%20MATERIAL%20BPHARMA/Module%203/semster-3/BP301T/BP301T-1.pdf)
5. <https://colapret.cm.utexas.edu/courses/notes/stereochemistry.pdf>

COURSE OUTCOME & PROGRAM OUTCOME MAPPING

CO-PO Mapping:

CO	PO1 Knowledge	PO2 Develop skills	PO3 Usage of Modern Tools	PO4 Scientific interpretation	PO5 Apply chemical knowledge	PO6 Ethical Practices and Social Responsibility	PO7 Communication
CO1	3	2	0	1	0	0	0
CO2	3	2	1	1	0	0	1
CO3	3	3	2	2	0	0	1
CO4	3	3	1	2	0	0	1
CO5	3	2	2	2	1	1	0

1: Low =1 ; 2: Moderate = 2 ; 3: High = 3

UNIT-I STRUCTURAL THEORY IN ORGANIC CHEMISTRY

CO1: Study Inductive effect, Mesomeric effect, Hyperconjugation and its applications

Mapping to POs:

- PO1 (Knowledge):** Students acquire conceptual and theoretical understanding of electronic effects (inductive, Mesomeric, hyperconjugation), which forms the foundation of chemical reactivity

UNIT-II SATURATED HYDROCARBONS (ALKANES & CYCLOALKANES)

CO2: Explain the preparation and chemical properties of alkanes, alkenes, alkynes and benzene

Mapping to POs:

- PO1 (Knowledge):** Learners explain the preparation and reactions of hydrocarbons, connecting theory with reaction mechanisms

UNIT-III: UNSATURATED HYDROCARBONS (ALKENES & ALKYNES)

CO3: Analyse and apply Huckel's rule to benzenoid and non-benzenoid aromatic compounds.

Mapping to POs:

- PO1 (Knowledge):** Knowledge Base through identifying aromatic character
- PO2 (Analytical, Logical, and Problem-Solving skills):** Application of Hückel's rule to aromaticity requires analytical and evaluative reasoning.

UNIT-IV: AROMATICITY, BENZENE AND ITS REACTIVITY

CO4: Differentiate between Markonikoff's and Anti-Markonikoff's addition, Ring activating and deactivating groups.

Mapping to POs:

PO1 (Knowledge): knowledge to Predicting product orientation

PO2 (Analytical, Logical, and Problem-Solving skills): By differentiating between Markonikoff's / Anti-Markonikoff's additions and activating / deactivating ring substituents, students practice mechanistic reasoning

Unit 5: STEREOCHEMISTRY OF CARBON COMPOUNDS

CO5 Interpret stereochemical representations and identify chiral molecules.

Mapping to POs:

- **PO1 (Knowledge):** Students learn to visualize and interpret 3D molecular geometry and chirality, directly strengthening fundamental knowledge

Weightage to content

Semester -I

Course - 1

S.No	Course Content	Long Answer	Short Answer	Total marks
1	STRUCTURAL THEORY IN ORGANIC	2	1	25
2	SATURATED HYDROCARBONS (ALKANES & CYCLOALKANES)	1	1	15
3	UNSATURATED HYDROCARBONS (ALKENES & ALKYNES)	1	2	20
4	AROMATICITY, BENZENE AND ITS REACTIVITY	1	1	15
5.	STEREOCHEMISTRY OF CARBON COMPOUNDS	1	2	20
	TOTAL	6	7	95

P.R. GOVERNMENT COLLEGE (A), KAKINADA

**I YEAR B.Sc Chemistry (Examination at the end of II semester)
(MAJOR – 3 ORGANIC CHEMISTRY)**

MODEL PAPER

Duration: 2hr

Max.Marks:50M

Section – 1

Answer any three of the following questions. Must attempt at least one question from each part. Each question carries 10 Marks. 3 X 10M = 30M

Part -A

1. UNIT 1
2. UNIT 2
3. UNIT 3

Part-B

4. UNIT 1
5. UNIT 4
6. UNIT 5

Section - II

Answer any four of the following questions. Each carries 5 marks. 4 X 5M= 20M

7. UNIT 1
8. UNIT 2
9. UNIT 3
10. UNIT 3
11. U NIT 4
12. UNIT 5
13. UNIT 5

SEMESTER-II
MAJOR – 3 ORGANIC CHEMISTRY

Practical

Credits: 1

2 hrs/week

Learning Out comes:

1. Understand mechanisms and conditions for common organic synthesis reactions (nitration, bromination, esterification, acetylation)
2. Perform organic synthesis using appropriate techniques such as heating, reflux, crystallization, and filtration.
3. Develop safe laboratory practices and chemical handling procedures.

Syllabus:

1. Preparation of tribromo aniline
2. Preparation of p-nitroacetanilide
3. Preparation of nerolin
4. Preparation of aspirin (Acetylsalicylic acid)
5. Preparation of paracetamol (Acetaminophen).

SCHEME OF VALUATION

Practical Paper – 3:: Organic Chemistry(at the end of semester II)

Systematic analysis of each component which involves following	
a. Equation with correct mechanism	10 marks
b. Procedure	15 marks
c. Recrystallization	05 marks
d. Calculation of yield and MP	10 marks
d. Viva voce	05 marks
e. Record	05 marks
TOTAL	50 marks

Lab References:

S.NO	AUTHOR	TITLE	PUBLISHER
1	V.K. Ahluwalia, R. Agarwal	Comprehensive Practical Organic Chemistry,	University Press,
2	K B.S. Furniss, A.J. Hannaford, P.W.G. Smith, A.R. Tatchell	Vogel's Textbook of Practical Organic Chemistry,	Pearson

QUESTION BANK

UNIT-1 LONG ANSWER QUESTIONS 10 MARKS

1. Write notes on reactive intermediates—carbocations, carbanions, and free radicals—with structure and stability order
2. Explain the applications of inductive and resonance effects on the acidity and basicity of organic compounds
3. Describe hyperconjugation in detail and discuss its influence on the stability of alkenes and carbocations

SHORT ANSWER QUESTIONS 5 MARKS

1. Write short notes on electrophiles and nucleophiles
2. Discuss types of bond fission with examples

UNIT-2 LONG ANSWER QUESTIONS 10 MARKS

1. Describe Baeyer's strain theory and its limitations
2. Explain the conformations of cyclohexane and represent the energy diagram
3. Describe the Born-Haber cycle with its application to the formation of an ionic compound

SHORT ANSWER QUESTIONS 5 MARKS

1. What are alkanes? Write two methods of their preparation.
2. Give the mechanism of a free radical substitution in alkanes

UNIT-3 LONG ANSWER QUESTIONS 10 MARKS

1. Explain Markonikoff's and Anti-Markonikoff's rules with examples
2. Discuss Saytzeff's and Hofmann's rules with examples

SHORT ANSWER QUESTIONS 5 MARKS

1. Write two methods of preparation of alkenes.
2. Why are terminal alkynes acidic?
3. Discuss Diels-Alder reactions with mechanisms
4. Discuss the 1,2- and 1,4-addition reactions in conjugated dienes.

UNIT-4 LONG ANSWER QUESTIONS 10 MARKS

1. Define aromaticity. Explain Hückel's rule with examples of benzenoid and non-benzenoid compounds
2. Discuss the mechanism of electrophilic substitution in Friedel-Craft's alkylation and acylation.
3. Explain the directive influence of substituents in electrophilic aromatic substitution reactions

SHORT ANSWER QUESTIONS 5 MARKS

1. Write the mechanism of nitration of benzene.
2. Explain why benzene is unusually stable
3. Differentiate between activating and deactivating substituents with one example each

UNIT-5 LONG ANSWER QUESTIONS 10 MARKS

1. Explain various molecular representations—Wedge, Fischer, Newman, and Saw-Horse projections—with examples
2. Describe the Cahn-Ingold-Prelog (CIP) sequence rules and assign R/S configuration to suitable examples
3. Explain elements of symmetry and their role in determining chirality

SHORT ANSWER QUESTIONS 5 MARKS

1. Define enantiomers and diastereomers
2. What is chirality? Give two examples of chiral molecules.
3. Write the D/L notation for glyceraldehyde

Co-Curricular Activities:

a) **Mandatory:(Lab/field training of students by teacher:(lab:10+field:05):**

1. **For Teacher: Training of students by teacher in laboratory and field for not less than 15 hours on the field techniques/skills of identification of Cations and Anions in the given mixture**

2. **For Student: Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observe the techniques used for the separation of organic compounds.**

Write their observations and submit a hand written fieldwork/project work report not exceeding 10 pages in the given format to the teacher.

3. **Max marks for Fieldwork/project work Report:05.**

4. **Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.**

5. **Unit tests (IE).**

b) **Suggested Co-Curricular Activities**

1. **Training of students' by related industrial experts.**

2. **Assignments, Seminars and Quiz (on related topics), collection of videos and other material**

3. **Visits of facilities, firms, research organizations etc.**

4. **Invited lectures and presentations on related topics by field/industrial experts**

	PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A) KAKINADA DEPARTMENT OF CHEMISTRY	Program & Semester			
Course Code CHE-4	TITLE OF THE COURSE MAJOR 4: PHYSICAL CHEMISTRY-1	I B.Sc. Chemistry (II Semester)			
Teaching	Hours Allocated: 45 (Theory)	L	T	P	C
Pre-requisites	Basic concepts of gaseous, solids and liquid states phase rule and surface chemistry	45	10	30	3+1

Course Outcomes:

On Completion of the course, the students will be able to	
CO1	Study solid, liquid and gaseous states of matter and its applications
CO2	Explain gas laws, ideal and real gases behaviour, and critical phenomena
CO3	Apply the phase rule to interpret phase diagrams and systems with eutectic/congruent/incongruent points
CO4	Differentiate between types of adsorption and colloidal systems, and evaluate their applications.
CO5	Interpret various metals its melting states in alloys

Syllabus:

UNIT-1: GASEOUS STATE

(9 h)

Gas laws, Ideal Gas equation, Vander Waal's equation of state, Andrew's isotherms of carbon dioxide, Critical phenomena, Relationship between critical constants and van der Waal's

constants, Law of corresponding states, Joule-Thomson effect, Inversion temperature.

UNIT-2: LIQUID STATE

(9 h)

Physical properties of liquids: Definition of vapour pressure, boiling point, surface tension and coefficient of viscosity, Effect of temperature and addition of solutes on surface tension and viscosity.

Liquid crystals: Mesomorphic state, Differences between liquid crystal and solid/liquid. Classification of liquid crystals into Smectic and Nematic, Application of liquid crystals as LCD devices.

UNIT-3: SOLID STATE

(9 h)

Law of constancy of interfacial angles, The law of rationality of indices-Miller indices, Symmetry in crystals, definition of lattice point, space lattice, unit cell, Bravais lattices and crystal systems, X-ray diffraction and crystal structure. Bragg's law and its derivation, Defects in crystals: Stoichiometric and Non-stoichiometric defects.

UNIT-4: PHASE RULE

(9 h)

The concept of phase, components, degrees of freedom, Gibbs phase rule, Phase diagram of one component system – water system, Definition and examples for systems having congruent and incongruent melting point, Study of Phase diagrams of Simple eutectic systems (i) Pb-Ag system, desilverisation of lead (ii) NaCl-Water system, freezing mixtures

UNIT-5: SURFACE CHEMISTRY

(9 h)

Colloids: Definition and classification of Colloids, Coagulation of colloids, Hardy-Schulze rule. Stability of colloids, Protection of Colloids-Gold number.

Adsorption: Physical and chemical adsorption, Freundlich and Langmuir adsorption isotherm, applications of adsorption.

Textbooks:

S.NO	AUTHOR	TITLE	PUBLISHER
1	R.N. Morrison, R.N. Boyd	Organic Chemistry,	Pearson Education,
2	P.Y. Bruice,	Organic Chemistry	Pearson Education,

REFERENCES:

1. P.W. Atkins, J.de., Paula, Atkin's Physical Chemistry 9th Edition, Oxford University Press, 2014.
2. D.W. Ball, Physical Chemistry, 2nd Edition, Cengage Learning, 2017.
3. G.W. Castellan, Physical Chemistry, 4th Edition, Narosa, 2014.
4. K.L. Kapoor, A Textbook of Physical Chemistry, 6th Edition, McGraw-Hill Education, 2015.

COURSE OUTCOME & PROGRAM OUTCOME MAPPING

CO-PO Mapping:

CO	PO1 Knowledge	PO2 Develop skills	PO3 Usage of Modern Tools	PO4 Scientific interpretation	PO5 Apply chemical knowledge	PO6 Ethical Practices and Social Responsibility	PO7 Communication
CO1	3	2	0	1	0	0	0
CO2	3	2	1	1	0	0	1
CO3	3	3	2	2	0	0	1
CO4	3	3	1	2	0	0	1
CO5	3	2	2	2	1	1	0

1: Low = 1 ; 2: Moderate = 2 ; 3: High = 3

UNIT-I GASEOUS STATE

CO1: Study solid, liquid and gaseous states of matter and its applications

Mapping to POs:

- **PO1 (Knowledge):** Students acquire conceptual and theoretical understanding of Study solid, liquid and gaseous states of matter and its applications, which forms the foundation of chemical reactivity

UNIT-II LIQUID STATE

CO2: Explain the preparation and properties of various types of liquid crystals

Mapping to POs:

- **PO1 (Knowledge):** Learners explain the preparation and reactions of liquid crystals

UNIT-III: SOLID STATE

CO3: Analyse and apply Bravis lattices and crystal systems

Mapping to POs:

- **PO1 (Knowledge):** Knowledge Base through identifying stoichiometric and non stoichiometric crystals
- **PO2 (Analytical, Logical, and Problem-Solving skills):** Application of Bravis rules to crystal systems

UNIT-IV: PHASE RULE

CO4: Differentiate between one component to multi component systems

Mapping to POs:

- PO1 (Knowledge):** knowledge to Predicting product orientation
- PO2 (Analytical, Logical, and Problem-Solving skills):** By differentiating between one component to two component systems analyse and solve live problems

Unit 5: SURFACE CHEMISTRY

CO5 Interpret the state of the substances by applying gels and emulsions properties

Mapping to POs:

- **PO1 (Knowledge):** Students learn to visualize and interpret 3D molecular geometry and chirality, directly strengthening fundamental knowledge

Weightage to content

Semester -I

Course - 1

S.No	Course Content	Long Answer	Short Answer	Total marks
1	GASEOUS STATE	2	1	25
2	LIQUID STATE	1	1	15
3	SOLID STATE	1	2	20
4	PHASE RULE	1	1	15
5.	SURFACE CHEMISTRY	1	2	20
	TOTAL	6	7	95

P.R. GOVERNMENT COLLEGE (A), KAKINADA

**I YEAR B.Sc. Chemistry (Examination at the end of II semester)
(MAJOR – 4 PHYSICAL CHEMISTRY-1
MODEL PAPER**

Duration: 2hr

Max.Marks:50M

Section – 1

Answer any three of the following questions. Must attempt at least one question from each part. Each question carries 10 Marks. 3 X 10M = 30M

Part -A

1. UNIT 1
2. UNIT 2
3. UNIT 3

Part-B

4. UNIT1
5. UNIT4
6. UNIT 5

Section - II

Answer any four of the following questions. Each carries 5 marks. 4 X 5M= 20M

7. UNIT 1
8. UNIT 2
9. UNIT 3
10. UNIT 3
11. U INIT 4
12. UNIT 5
13. UNIT 5

SEMESTER-II
MAJOR – 4 PHYSICAL CHEMISTRY-1

Practical

Credits: 1

2 hrs/week

Learning Out comes:

1. To understand the concepts of surface tension and viscosity of liquids.
2. To familiarize students with using different lab equipment and glassware for the determination of the coefficient of viscosity and surface tension.
3. To gain hands-on experience in preparing colloidal solutions.

Syllabus:

4. Determination of surface tension of liquid by drop count method.
5. Determination of surface tension of liquid by drop weight method.
6. Determination of coefficient of viscosity of an organic liquid.
7. Preparation of sols: $\text{Al}(\text{OH})_3$, $\text{Fe}(\text{OH})_3$ and starch.
8. Adsorption of acetic acid on animal charcoal, verification of Freundlich isotherm.

SCHEME OF VALUATION

Practical Paper – 4 :: **PHYSICAL CHEMISTRY-1** (at the end of semester II)

Systematic analysis of each component which involves following	
a. Formula with terms explanation	10 marks
b. Procedure	10 marks
c. Neat tabular forms	05 marks
d. Calculation and report	10 marks
d. Viva voce	05 marks
e. Record	05 marks
TOTAL	50 marks

I. REFERENCES:

1. B.D. Khosla, V.C. Garg, A. Gulati, Senior Practical Physical Chemistry, R. Chand & Co, New Delhi, 2015.
2. K.L. Kapoor, A Textbook of Physical Chemistry, McGraw-Hill Education, 2019.
3. C.W. Garland, J.W. Nibler, D.P. Shoemaker, Experiments in Physical Chemistry, 8th Edition, McGraw-Hill, New York, 2003.

Co-Curricular Activities:

a) Mandatory:(Lab/field training of students by teacher:(lab:10+field:05):

1. For Teacher: Training of students by teacher in laboratory and field for not less than 15 hours on the field techniques/skills of identification of Cations and Anions in the given mixture
2. For Student: Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observe the techniques used for the separation of organic compounds. Write their observations and submit a hand written fieldwork/project work report not exceeding 10 pages in the given format to the teacher.

3. Max marks for Fieldwork/project work Report:05.

4. Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.

5. Unit tests (IE).

b) Suggested Co-Curricular Activities

1. Training of students' by related industrial experts.
2. Assignments, Seminars and Quiz (on related topics), collection of videos and other material
3. Visits of facilities, firms, research organizations etc.
4. Invited lectures and presentations on related topics by field/industrial experts

ASSESSMENT METHODS:

9. Internal Practical Assessment
10. Lab Record Evaluation
11. Final Practical Examination
12. Oral/Viva Voce

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A) :: KAKINADA
II YEAR B.Sc Chemistry Hons (2023-24 AB)
(Examination at the end of IV semester)
Course-9 :: Physical Chemistry-II

Question Bank

Unit-1:

Essay Questions:

1. Derive the following laws from kinetic theory of gases?
a) Boyle's law b) Avogadro's law d) Dalton's Law
2. Elaborate Vander Waal equation of state?
3. Derive the mathematical relation between Vander Waal constants and critical constants?

Short answer Questions:

1. Write the postulates of kinetic theory of gases?
2. Discuss the Anderw's Isotherm of carbon dioxide?
3. Explain the reduced equation of state and law of corresponding states?
4. What is Joule-Thomson effect and explain inversion temperature?

Unit-2:

Essay Questions:

1. What are liquid crystals and explain their classification?
2. Define surface tension & explain its determination by using drop count method?
3. What is the coefficient of viscosity & explain its determination by using viscometer.

Short answer Questions:

1. Write the applications of liquid crystals?
2. Explain the differences between liquid crystal and solid/liquids
3. Elaborate on the Qualitative discussion of the structure of water.

Unit-3:

Essay Questions:

1. Explain the law of symmetry in crystals?
2. Derive Bragg's equation for the determination of crystal structure?
3. Explain the stoichiometric and non-stoichiometric defects in crystals?

Short answer Questions:

1. Explain the law of constancy of interfacial angles?
2. Define space lattice, lattice point & unit cell?
3. Write about the different crystal systems with examples?
4. what is law of rational indices?

Unit-4:

Essay Questions:

1. Explain the phase diagram of the Water system?
2. Elaborate the phase diagram of the NaCl- Water system?
3. Discuss the phase diagram of the Ag-Pb system

Short answer Questions:

1. Define phase rule and explain the terms involved in it.
2. Discuss the Pattinson's process for the desilverisation of lead?
3. Define congruent and incongruent melting points give examples?
4. Write a short note on freezing mixtures.

Unit-5:

Essay Questions:

1. Define Langmuir adsorption isotherm and explain?
2. What is physisorption and Chemisorption and write their differences?
3. Explain the various factors that effecting adsorption of gases on solids?
4. Explain the following
 - a) Hardy-Schulze rule.
 - b) Gold number
 - c) Coagulation

Short answer Questions:

1. Define colloids and their classification?
2. Write a short note on Freundlich adsorption isotherm.
3. Write the applications of adsorption?