


B.SC

INDUSTRIAL CHEMISTRY

	Government College (Autonomous) Rajahmundry	Program & Semester II B.Sc. INDUSTRIAL L CHEMISTRY (SEMESTER – III)			
Course Code	TITLE OF THE COURSE Course -5: ORGANIC CHEMISTRY				
Teaching	Hours Allocated: 45 (Theory) (3 hrs. / Wk.)	L	T	P	C
Pre-requisites:	Basic knowledge organic chemistry	3	-	-	3

Course Objectives:

1. To provide basic knowledge about structural theory in organic chemistry
2. To provide knowledge on alkenes, alkynes and its applications
3. Gain knowledge on benzene and its derivatives in synthetic organic chemistry

Course Outcomes:

On Completion of the course, the students will be able to-		Cognitive Domain
CLO1	Know the concepts of inductive effect, mesomeric effect and hyper conjugation	Knowledge
CLO2	Understand the basic concepts in Organic chemistry	Understanding
CLO3	Apply the knowledge of structural theories of organic compounds	Applying
CLO4	Synthesis of Alkenes, Alkynes, Cycloalkanes and Benzene	Evaluating
CLO5	Properties of Alkene, Alkynes, Cycloalkanes, Benzenes and its mechanisms	Analysing

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	
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Syllabus:

UNIT-I:

9 Hrs.

STRUCTURAL THEORY IN ORGANIC CHEMISTRY

Types of bond fission and organic reagents (Electrophilic, Nucleophilic, and free radical reagents including neutral molecules like H₂O, NH₃ & AlCl₃).

Inductive effect. Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions. Resonance or Mesomeric effect, application to (a) acidity of phenol, and (b) acidity of carboxylic acids. Hyper conjugation and its application to stability of carbonium ions, Free radicals and alkenes, carbanions..

Types of Organic reactions : Addition - electrophilic, nucleophilic and free radical. Substitution - electrophilic, nucleophilic and free radical. Elimination- Examples.

UNIT-II:

9 Hrs.

ACYCLIC HYDROCARBONS

Alkenes - Preparation of alkenes. Properties: Addition of hydrogen - heat of hydrogenation and stability of alkenes. Addition of halogen and its mechanism. Addition of HX, Markonikov's rule, addition of H₂O, HOX, H₂SO₄ with mechanism and addition of HBr in the presence of peroxide (anti - Markonikov's addition).

Dienes - Types of dienes, reactions of conjugated dienes - 1,2 and 1,4 addition of HBr to 1,3 - butadiene and Diel's - Alder reaction

UNIT-III:

9 Hrs.

Alkynes - Preparation by dehydrohalogenation of dihalides, dehalogenation of tetrahalides, Properties; Acidity of acetylenic hydrogen (formation of Metal acetylides).

Preparation of higher acetylenes, Metal ammonia reductions, Physical properties. Chemical reactivity - electrophilic addition of X₂, HX, H₂O (Tautomerism), Oxidation with KMnO₄, OsO₄, reduction and Polymerisation reaction of acetylene.

UNIT-IV:

9 Hrs.

ALICYCLIC HYDROCARBONS (CYCLOALKANES)

Nomenclature, Preparation by Freund's method, Wislicenus method. Properties - reactivity of cyclopropane and cyclobutane by comparing with alkanes,

Stability of cycloalkanes - Baeyer's strain theory, Sachse and Mohr predictions and Pitzer's strain theory. Conformational structures of cyclobutane, cyclopentane, cyclohexane.

UNIT - V:

BENZENE AND ITS REACTIVITY

Concept of aromaticity - aromaticity (definition), Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation)

Reactions - General mechanism of electrophilic substitution, mechanism of nitration, Friedel Craft's alkylation and acylation.

Orientation of aromatic substitution - Definition of ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like NO₂ and Phenolic). Orientation of (i) Amino, methoxy and methyl groups (ii) Carboxy, nitro, nitrile, (iii) Halogens

List of Reference Books

1. NCERT +1 and +2
2. Unified chemistry textbook, O.P.Agarwal

CLO-PLO Mapping:

(1: Slight[Low]; 2: Moderate[Medium]; 3: Substantial[High], '-': No Correlation)

	CLO\ PLO	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10
Inorganic Chemistry	CLO1	3	2	2	1	1	0	0	0	3	0
	CLO2	3	1	2	1	1	0	0	0	3	0
	CLO3	3	3	3	1	1	0	0	0	3	0
	CLO4	3	3	3	2	2	0	0	0	3	0
	CLO5	3	3	3	2	2	0	0	0	3	0
	Avg.	3	2.4	2.6	1.4	1.4	0	0	0	3	0

GOVERNMENT COLLEGE (A), RAJAMAHENDRAVARAM

B.Sc. INDUSTRIAL CHEMISTRY (Hons.) SEMESTER-III

CHEMISTRY COURSE-5: ORGANIC CHEMISTRY

QUESTION PAPER BLUE PRINT

TIME: 2¹/₂ hrs.

MAX. MARKS: 50

PART – A

Answer **ALL** the following questions.

5x7 = 35 M

1a Question from UNIT-I

OR

1b Question from UNIT-I

2a Question from UNIT-II

OR

2b Question from UNIT-II

3a Question from UNIT-III

OR

3b Questions from UNIT-III

4a Question from UNIT-IV

OR

4b Question from UNIT-IV

5a Question from UNIT-V

OR

5b Question from UNIT-V

PART – B

Answer any **FIVE** of the following questions.

5x3 = 15 M

6 Questions from UNIT-I

7 Questions from UNIT-II

8 Questions from UNIT-III

9 Questions from UNIT-III

10 Questions from UNIT-III

11 Questions from UNIT-III

12 Questions from UNIT-IV

13 Questions from UNIT-V

GOVERNMENT COLLEGE (A), RAJAMAHENDRAVARAM
II B.Sc. ORGANIC CHEMISTRY (Hons.) SEMESTER-III
CHEMISTRY COURSE-5: ORGANIC CHEMISTRY

MODEL QUESTION PAPER

TIME: 2½ hrs.

MAX. MARKS: 50

PART – A

Answer **ALL** the following questions.

5x7 = 35 M

	Marks	BL	CLO	PLO	PI
1a) What is inductive effect? Explain its applications <i>OR</i>	7	2	1	1	
1b) Explain types of organic reactions with examples	7	2	2	2	
2a) Explain the preparation methods and chemical properties of alkenes <i>OR</i>	7	2	1	2	
2b) Explain 1,2 – and 1,4 – addition reactions in conjugated dienes	7	2	3	2	
3a) Write the preparations and chemical properties of alkynes <i>OR</i>	7	5	1	9	
3b) Explain the chemical properties of higher alkynes	7	2	2	5	
4a) Explain the preparation and chemical properties of cycloalkanes <i>OR</i>	7	4	1	3	
4b) How Baeyer strain theory is used for explaining the stability of cycloalkanes.	7	3	4	2	
5a) Explain the concept of aromaticity based on Huckels rule <i>OR</i>	7	6	5	5	
5b) Explain aromatic substitution reactions of	7	3	4	4	

Benzene.


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PART – B

Answer any **FIVE** of the following questions.

5x3 = 15 M

	Marks	BL	CLO	PLO	PI
6) Write briefly about organic reagents	3	1	1	1	
7) Explain the acidity of phenols by using mesomeric effect	3	2	2	2	
8) Discuss Markonikov's rule	3	2	1	3	
9) What is Diels - Alder reaction? Give example	3	6	3	5	
10) Write briefly about the acidity of alkynes.	3	5	3	9	
11) What are cyclo alkanes? Give example	3	2	5	2	
12) What are ring activation groups? give example	3	4	4	3	
13) Differentiate between benzenoid and non – benzenoid aromatic compounds.	3	5	5	4	

	Government College (Autonomous) Rajahmundry	Program & Semester			
Course Code C5	TITLE OF THE COURSE Course -5: ORGANIC FUNCTIONAL GROUP ANALYSIS	II .Sc.INDUSTRIAL CHEMISTRY (III Semester)			
Teaching	Hours Allocated: 30 (Practical)	L	T	P	C
Pre-requisites	Organic qualitative analysis and functional groups	-	-	2	1

Course Objectives:

- To provide basic knowledge about organic functional groups
- To provide knowledge about the analysis of organic functional groups
- To provide practical handling of laboratory apparatus involving the organic functional group analysis

Course Outcomes:

On Completion of the course, the students will be able to

CO1	Identify different organic functional groups
CO2	Get practical skill to the analysis of different organic functional groups
CO3	Identify different unknown components present in the given organic compounds
CO4	Acquire knowledge on the nature of the organic compounds

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	-
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Practical Syllabus:

50 M

Organic functional group analysis:

Reactions of the following functional groups present in organic compounds (at least 4)

Alcohols, Phenols, Aldehydes, ketones, Carboxylic Acids and Amines

CLO-PLO Mapping:

(1: Slight[Low]; 2: Moderate[Medium]; 3: Substantial[High], '-': No Correlation)

	CLO\ PLO	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10
Titrimetric Analysis	CLO1	3	2	2	3	2	1	0	0	3	0
	CLO2	3	2	2	3	2	1	0	0	3	0
	CLO3	3	3	3	3	2	1	0	0	3	0
	CLO4	3	3	3	3	2	1	0	0	3	0
	Avg.	3	2.5	2.5	3	2.0	1	0	0	3	0

GOVERNMENT COLLEGE (A), RAJAMAHENDRAVARAM

I B.Sc. INDUSTRIAL CHEMISTRY (Hons.)2024-25

III SEMESTER END EXAMINATIONS

LABORATORY COURSE-: ORGANIC FUNCTIONAL GROUP ANALYSIS - PRACTICAL

Scheme of Valuation


Time: 3 Hours

Max. Marks: 50

1. Record	10 Marks
2. Practical	35 Marks
3. Viva - voce	5 Marks

Splitting of Practical Marks:

i. Preliminary examination in 10 minutes	: 5 M
ii. Confirmation test	: 10 M
iii. Preparation derivative	: 10 M
v. Report	: 10 M

	Government College (Autonomous) Rajahmundry	Program & Semester II B.Sc. INDUSTRIAL CHEMISTRY (H) (SEMESTER – III)			
Course Code C6	TITLE OF THE COURSE Course -6: ORGANIC CHEMISTRY-II (Halogen and Oxygen containing organic compounds)				
Teaching	Hours Allocated: 45 (Theory) (3 hrs. / Wk.)	L	T	P	C
Prerequisites:	Basic knowledge on structure and reactivity of organic compounds	3	-	-	3

Course Objectives:

1. To provide knowledge on reactivity of Halogen and Oxygen containing organic compounds
2. To provide basic awareness on preparatory methods of Halogen and Oxygen containing organic compounds
3. To understand classification of carbohydrates and structural elucidation of glucose & fructose

Course Outcomes:

On Completion of the course, the students will be able to-		Cognitive Domain
CO1	Understand the concept of SN ₁ and SN ₂ mechanisms	Understanding
CO2	Describe the reactivity of alkyl halides, alcohols and phenols.	Application
CO3	Achieve the skills required to propose various mechanisms	Skill
CO4	Apply the concepts for synthesising various Halogen & oxygen containing organic compounds	Application

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	
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Syllabus:

Unit – I Halogen compounds (9 h)

Alkyl halides: Preparation of alkyl halides from i) alkanes, ii) alkenes and iii) alcohols. Properties - nucleophilic substitution reactions— S_N1 and S_N2 mechanisms with energy profile diagrams and stereo chemical aspects . Williamson's synthesis.

Aryl halides: Preparation i) from phenols ii) Sandmeyer's reaction, nucleophilic aromatic substitution (Benzyne mechanism); relative reactivity of alkyl, allyl, vinyl and benzyl, aryl halides towards nucleophilic substitution reactions.

Unit II Alcohols and Phenols (9 h)

Alcohols: Nomenclature, classification, Preparation of $1^0, 2^0, 3^0$ alcohols from Grignard's reagent, Bouveault–Blanc Reduction; Chemical properties –A) Reactions involving only the hydrogen atom of -OH group B) Reactions involving -OH group as a whole. Distinction between $1^0, 2^0, 3^0$ alcohols with Lucas reagent. Pinacol Pinacolone arrangement with mechanism.

Phenols : Preparation from diazonium salt and Cumene. Reactions and mechanism—Reimer–Tiemann, Kolbe–Schmitt Reactions, Fries and Claisen rearrangements

Unit III Carbonyl Compounds (9 h)

Preparation from Acid chlorides, 1,3-dithiane and nitriles; Structure and reactivity of carbonyl group, Nucleophilic addition reactions with HCN, NaHSO₃ and alcohols. addition-

elimination reactions with hydroxylamine, hydrazine, phenyl hydrazine, 2,4DNP, semicarbazide. Oxidations and reductions (Baeyer -Villiger oxidation, KMnO₄, Clemmensen's, Wolf–Kishner's, with LiAlH₄ & NaBH₄).

Reaction & Mechanism- Aldol condensation, Cannizzaro reaction, Perkin reaction, Benzoin condensation, Claisen-Schmidt reaction, Haloform reaction

Unit-IV Carboxylic acid and Active methylene Compounds (9h)

Carboxylic Acids: Preparation from Grignard reagent and hydrolysis of nitriles, Reactions of monocarboxylic acids- Reactions involving -H, -OH and -COOH groups, formation of salts, esters, acid chlorides, amides and anhydrides. Degradation of carboxylic acids by Hunsdiecker's reaction, decarboxylation by Schmidt reaction, Arndt-Eistert synthesis, halogenation by Hell- Volhard- Zelinsky reaction. Mechanisms of acidic and alkaline hydrolysis of esters, Reformatsky reactions, Curtius rearrangement.

Active methylene compounds: Ketoenol tautomerism, preparation of Aceto Acetic Ester(AAE) by Claisen condensation with mechanism, synthetic applications of AAE in the preparation of mono carboxylic acids, di carboxylic acids, α,β -unsaturated acids and heterocyclic compounds.

Unit V : Carbohydrates (9 h)

Classification and their biological importance, Monosaccharides: Structural elucidation of glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth projections and conformational structures; Interconversions of aldoses and ketoses; Killiani-Fischer synthesis and Ruff degradation.

List of Reference Books

1. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Guide book to Mechanism in Organic Chemistry by Peter Sykes 6th edition, 1985.

CO-PO Mapping:

(1: Slight[Low]; 2: Moderate[Medium]; 3: Substantial[High], '-': No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	2	3	2	2	2	3	3	2	2	3	3	3
CO2	2	3	3	3	3	2	1	2	2	3	2	2	3
CO3	3	3	3	2	2	1	1	2	3	1	2	3	3
CO4	2	1	1	1	3	2	3	1	2	3	2	3	2
Avg.	2.25	2.25	2.5	2.0	2.5	1.75	2.0	2.0	2.25	2.25	2.25	2.75	2.75

**GOVERNMENT COLLEGE (A), RAJAMAHENDRAVARAM II B.Sc.
INDUSTRIAL CHEMISTRY(H)**

SEMESTER – III

Course -6: ORGANIC CHEMISTRY-II

(Halogen and Oxygen containing organic compounds)

WEIGHTAGE TO CONTENT & BLUE PRINT

S.NO.	COURSE CONTENT	LONG ANSWER QUESTIONS	SHORT ANSWER QUESTIONS	TOTAL MARKS	
1.	UNIT - I	2	1	17	
2.	UNIT – II	2	2	20	
3.	UNIT – III	2	2	20	
4.	UNIT – IV	2	2	20	
5.	UNIT - V	2	1	17	
	TOTAL	10	8	94	

GOVERNMENT COLLEGE (A), RAJAHMUNDRY II B.Sc.

CHEMISTRY(H)

SEMESTER-III MODEL PAPER

Course - 6: ORGANIC CHEMISTRY -II(Halogen and Oxygen containing organic compounds)

Time: 2¹/₂ hrs.

Maximum Marks: 50

PART-

A

Answer ALL the questions. Each carries SEVEN marks

5 x 7 = 35 M

1. Discuss the mechanism and stereochemistry of SN¹ and SN² reactions taking suitable examples. BT2 CO1

(OR)

2. Write a short note on the following BT1 CO3

i) Sandmeyer reaction b) Benzyne mechanism

3. a) Write the preparation of alcohols using Grignard reagent and Bouveault - Blanc reduction BT1 CO4

b) Explain Lucas method for identification of 1^o, 2^o, 3^o alcohols. BT3 CO2

(OR)

4. Explain the mechanism of Reimer-Tiemann and Kolbe-Schmidt reaction. BT1 CO3

5. How does Acetone react with the following reagents BT3 CO3

i) HCN ii) NaSHO₃ iii) NH₂OH iv) NH₂NH₂

(OR)

6. Discuss the mechanism of Aldol condensation and Cannizzaro reaction BT1 CO2

7. Explain the acidic and alkaline hydrolysis of esters with mechanism. BT2 CO2

(OR)

8. Write the preparation and any two synthetic applications of Aceto Acetic Ester. BT2 CO1

9. Discuss the constitution and configuration of glucose with experimental evidence and Write objections for open chain structure of glucose. BT3 CO3


(OR)

10. How do you convert i) Glucose to Fructose ii) Aldopentose to Aldohexose BT2 CO4

PART- B

Answer any FIVE of the following questions. Each carries THREE marks 5 x 3 = 15 M

11. Compare the reactivity of alkyl halides and vinyl halides BT4 CO2
12. Write the mechanism for Pinacol-Pinacolone rearrangement. BT2 CO1
13. Write a short note on Fries rearrangement. BT1 CO3
14. Give any two reduction reactions of carbonyl compounds. BT1 CO4
15. Explain the mechanism of Perkin reaction BT2 CO1
16. Write any two preparation methods for carboxylic acids. BT1 CO4
17. Write the mechanism of Hunsdiecker's reaction BT2 CO3
18. What is mutarotation? Why glucose shows mutarotation? BT2 CO2

	Government College (Autonomous) Rajahmundry	Program & Semester			
Course Code C6P	TITLE OF THE COURSE Course -6: ORGANIC PREPARATIONS (Halogen and Oxygen containing organic compounds)	II B.SC INDUSTRIAL CHEMISTRY(H) (III Semester)			
Teaching	Hours Allocated: 30 (Practical)	L	T	P	C
Pre-requisites	Basic knowledge on handling of glassware and chemicals	-	-	2	1

Course Objectives:

19. To provide basic knowledge about the handling of laboratory apparatus
20. To provide knowledge on calculating limiting reagent, theoretical yield, and percent yield.
21. To provide hands on training on laboratory techniques including reflux, distillation, recrystallization, vacuum filtration.

Course Outcomes:

On Completion of the course, the students will be able to	
CO1	How to use glassware, equipment and chemicals and follow experimental procedures in the laboratory.
CO2	How to calculate limiting reagent, theoretical yield, and percent yield.
CO3	How to perform common laboratory techniques including reflux, distillation, recrystallization, vacuum filtration.
CO4	How to critically evaluate data collected to determine the identity, purity and percent yield of products and to summarize findings in writing in a clear and concise manner.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	-
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Syllabus - Organic preparations (50M)

1. Acetylation of β -naphthol, vanillin and salicylic acid by:

1. Using conventional method.

2. Using green approach

2. Preparation of Nerolin


Reference books:

- Vogel A.I. Practical Organic Chemistry, Longman Group Ltd.
- Bansal R.K. Laboratory Manual of Organic Chemistry, Wiley-Eastern.
- Ahluwalia V. K. and Agarwal R. Comprehensive Practical Organic Chemistry, University press

CO-PO Mapping:

1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], 4: (No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	3	3	2	3	2	2	2	3	2	2	3	3
CO2	3	3	3	2	3	2	2	3	2	3	3	3	3
CO3	3	2	3	2	3	1	2	2	2	2	2	3	2
CO4	3	3	2	1	3	2	2	1	2	3	3	3	3
Avg.	2.75	2.75	2.75	2	3	2	2	2	2.25	2.5	2.5	3	2.75

	Government College (Autonomous) Rajahmundry				
Course Code 7	TITLE OF THE COURSE PHYSICAL CHEMISTRY	Program & Semester II B.Sc. INDUSTRIAL, Chemistry (H) III Semester Course 7			
Teaching	Hours Allocated: (Theory) 45	L	T	P	C
Pre-requisites:	Basic Knowledge about Solids, Liquids, Gases and Solutions	3		-	3

Course Objectives:

The objective of this course is to provide students with a comprehensive understanding of the essential concepts and applications of Solids, liquids, gases, solutions and ionic equilibria. The course aims to develop students' critical thinking, problem-solving, and analytical skills in

these areas, enabling them to apply scientific principles to real-world situations.

On Completion of the course, the students will be able to-		Cognitive Domain
CLO1	Gain Knowledge about the concepts of Solutions . solids. Liquids .gases and ionic equilibrium	Knowledge
CLO2	At the end of the course , the students will be able to Understand the basic concepts of Solids, Liquids, Gases. Solutions and ionic equilibria	Understanding
CLO3	application of Distribution law to various systems, application of liquid crystals to LCD devices	Application
CLO4	compare and conclude theoretical concepts and applications to day to situations	Evaluation
CLO5	Analyze and calculate the mathematical problems on different concepts	Analysis

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	
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Syllabus:

PHYSICAL CHEMISTRY

3 hrs/week

UNIT-I

9h

SOLID STATE: Symmetry in crystals. Law of constancy of interfacial angles. The law of rationality of indices. The law of symmetry. Definition of lattice point, space lattice, unit cell. X-ray diffraction and crystal structure. Bragg's law. Defects in crystals. Stoichiometric and non-stoichiometric defects.

UNIT-II

9h

GASEOUS STATE Introduction and derivation of Ideal Gas Equation. Vander Waal's equation of state. P-V Isotherms of real gases, Andrew's isotherms of carbon dioxide. Critical phenomena. The vanderwaal's equation and the critical state. Law of corresponding states. Relationship between critical constants and vander Waal's constants. Joule Thomson effect.

UNIT-III:

9h

LIQUID STATE Structural differences between solids, liquids and gases. Liquid crystals, the mesomorphic state. Classification of liquid crystals into Smectic and Nematic. Differences between liquid crystal and solid/liquid. Application of liquid crystals as LCD devices.

UNIT-IV

9h

SOLUTIONS Liquid-liquid - ideal solutions, Raoult's law. Ideally dilute solutions, Henry's law. Non-ideal solutions. Azeotropes-HCl-H₂O, ethanol-water systems and fractional distillation. Partially miscible liquids-phenol-water. Effect of impurity on consolute temperature. Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law.

UNIT-V

9h

IONIC EQUILIBRIUM AND HSAB Ionic Product, common ion effect, solubility and solubility product. Definition of acid and base with examples, Pearson concept, HSAB Principle & its importance definition of buffer solution. Henderson –Hassel batch Equation

List of Reference Books

Books 1. Principles of physical chemistry by Prutton and Marron

Solid State Chemistry and its applications by Anthony R. West

Text book of physical chemistry by K L Kapoor

Text book of physical chemistry by S Glasstone

Advanced physical chemistry by Bahl and Tuli

Web Links:

<https://youtu.be/IPN0WWfwts?list=PLHhInNg2PQWVHNecGWt3YAxFcKTW44nJX>

<https://youtu.be/cmnqmdTZU80>

CLO-PLO Mapping:

(1: Slight[Low]; 2: Moderate[Medium]; 3: Substantial[High], '-': No Correlation)

Proposed Activities:

Skill Development: 1.

Employability

	PL O1	PL O2	PL O3	PL O4	PL O5	PL O6	PL O7	PL O8	PL O9	P L O 10
CLO1	3	2	2	1	1	0	0	0	3	0
CLO2	3	1	2	1	1	0	0	0	3	0
CLO3	3	3	3	1	1	0	0	0	3	0
CLO4	3	3	3	2	2	0	0	0	3	0
CLO5	3	3	3	2	2	0	0	0	3	0
Avg.	3	2.4	2.6	1.4	1.4	0	0	0	3	0

GOVERNMENT COLLEGE (A)

RAJAMAHENDRAVARAM

II B.Sc. ,ORGANIC,INDUSTRIAL,ANALYTICAL CHEMISTRY(H)

SEMESTER-III

QUESTION PAPER BLUEPRINT

Course -7: PHYSICAL CHEMISTRY

TIME: 2¹/₂ hrs.

MARKS: 50 M

PART -A

Answer ALL the Questions

5 x 7 = 35 M

1. 2 Questions from UNIT- I
2. 2 Questions from UNIT- II
3. 2 Questions from UNIT-III
4. 2 Questions from UNIT IV
5. 2 Questions from UNIT-V

PART - B

Answer any FIVE Questions

5 x 3 = 15 M

6. 2 Question from UNIT- I
7. 2 Questions from UNIT- II
8. 1 Question from UNIT- III
9. 2 Questions from UNIT- IV
10. 1 Questions from UNIT- V

Organic, Industrial, Analytical CHEMISTRY (H)

SEMESTER-III

MODEL PAPER (From 2024-25)

Course – 7 Physical chemistry

Time: 2½ hrs.

Maximum Marks: 50 answer

ALL the questions. Each carries SEVEN marks

5 x 7 = 35 M

	Marks	BL	CLO	PLO	PI
1. Explain Crystal defects (or)	7	2	1	1	
2. What is Bragg's Law. Derive bragg's equation	7	2	2	2	
3. Derive the relationship between Critical & Vanderwaal constants (or)	7	2	1	2	
4. Derive the Vander Waal's equation of state	7	2	3	2	
5. Differentiate between liquid crystals & liquids (or)	7	5	1	9	
6. Discuss any three applications of Liquid crystals.	7	2	2	5	
7. Explain Nernst distribution Law. Explain its applications (or)	7	4	1	3	
8. Explain what azeotropes are, Discuss the behavior of HCl-H ₂ O and ethanol-water systems as azeotropes	7	3	4	2	
9. Explain the Hard and Soft Acids and Bases (HSAB) principle (or)	7	6	5	5	
10. Using the Henderson- Hasselbalch Eq describe how the pH of a buffer solution can be calculated	7	3	4	4	


PART-B

Answer any FIVE Questions

5 × 3 = 15 M

- 11. write number of atoms in fcc and bcc unit cells**
- 12 Discuss the Law of Constancy of Interfacial Angles**
- 13. Explain the Joule-Thomson effect and its importance in thermodynamics.**
- 14. using Andrew's isotherms how do you explain behavior of carbon dioxide near its critical point?**
- 15. What are Smectic & Nematic liquid Crystals? Explain**
- 16. Describe the principle of steam distillation. Why is it particularly useful for immiscible liquids?**
- 17. A solid X is added to a mixture of benzene and water. After shaking well and allowing to stand, 10 ml of the benzene layer was found to contain 0.13 g of X and 100 ml of water layer contained 0.22g of X. Calculate the value of distribution coefficient.**
- 18. , Explain common ion effect**

Marks	BL	CLO	PLO	PI
3	1	1	1	
3	2	2	2	
3	2	1	3	
3	6	3	5	
3	5	3	9	
3	2	5	2	
3	4	4	3	
3	5	5	4	

	Government College (Autonomous) Rajahmundry		Program & Semester II B.Sc. ,INDUSTRIA L, CHEMISTRY (H) (III Semester)			
Course Code Major7 practical	TITLE OF THE COURSE Course -7: Physical chemistry practical					
Teaching	Hours Allocated: 30 (Practical)		L	T	P	C
Pre-requisites	Theoretical Knowledge about liquid properties like surface tension and viscosity, Knowledge about partition coefficient		-	-	2	1

Course Objectives:

- a. Measurement of liquid property like Surface tension, Viscosity
- b. Measurement of partition coefficient of substance between two liquids
- c. Correct Usage of different lab equipment

Course Outcomes:

On Completion of the course, the students will be able to	
CO1	Understand the basic concepts surface tension. viscosity and partition coefficient
CO2	Usage of glassware, equipment used for surface tension, viscosity and Partition coefficient measurement
CO3	Acquire knowledge of measurement of surface tension. viscosity of different liquids and distribution coefficient of substance between two liquids procedure.
CO4	Acquire knowledge of accurate measurement . tabulation of readings and calculation of results

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	-
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SYLLABUS

Credits: 1 (2 hrs/week)

Determination of molecular status and partition coefficient of benzoic acid in Benzene and water.

Determination of Surface tension of liquid 1

Determination of Surface tension of liquid 2

Determination of Viscosity of liquid.1

Determination of Viscosity of liquid.2

List of Reference Books

1. O.P. Pandey, D.N. Bajpai & S. Giri, Practical Chemistry, S. Chand & Company Ltd.
2. B. D. Khosla, V. C. Garg & A. Gulati, Senior Practical Physical Chemistry, S. Chand & Co.: New Delhi (2011).
3. C. W. Garland, J.W. Nibler, & D.P. Shoemaker, Experiments in Physical Chemistry 8th Ed.; McGrawHill: New York (2003).
4. R.C. Das and B. Behra, Experiments in Physical Chemistry; Tata McGraw Hill.


Web Links:

<https://youtu.be/xGIXcpcPgYs>

CLO-PLO Mapping:

1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], 4: (No Correlation)

	PL O1	PL O2	PL O3	PL O4	PL O5	PL O6	PL O7	PL O8	PL O9	P L O 10
CLO1	3	2	2	3	2	1	0	0	3	0
CLO2	3	2	2	3	2	1	0	0	3	0
CLO3	3	3	3	3	2	1	0	0	3	0
CLO4	3	3	3	3	2	1	0	0	3	0
Avg.	3	2.5	2.5	3	2	1	0	0	3	0

	Government College (Autonomous) Rajahmundry	Program & Semester II B.Sc. INDUSTRIAL CHEMISTRY (SEMESTER – III)			
Course Code	TITLE OF THE COURSE Course -08: INORGANIC METERIALS				
Teaching	Hours Allocated: 60 (Theory) (4 hrs. / Wk.)	L	T	P	C
Pre-requisites:	Basic knowledge about inorganic material	3	-	-	3

Course Objectives:

- To provide basic knowledge on silicates and manufacturing of glasses
- To provide basic awareness on concepts of ceramics and cements
- To give the basic knowledge on fertilizers
- To provide knowledge on manufacture of steel
- To Provide the knowledge on paints and pigments

Course Outcomes:

On Completion of the course, the students will be able to-		Cognitive Domain
CO1	Describe the composition of different types of glasses.	Knowledge and Application
CO2	To understand different types of ceramics and their uses.	Knowledge
CO3	Describe the steps involved in the manufacturing of cement	Understand and application
CO4	Describe the classification of alloys and steps involved in manufacturing of steel	Application
CO5	Describe the differences between paints and pigments	Knowledge

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	
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SYLLABUS

Unit-I

12 Hours

Silicate Industries-1

Glass: Silicates Introduction, structure, types- orthosilicates, pyrosilicates, chain silicates, cyclic silicates, sheet silicates, on-silicates types. Glassy state and its properties, Manufacture and processing of glass. Composition and properties of the following types of glasses: Soda lime glass, lead glass, armored glass, safety glass, borosilicate glass, fluorosilicate, coloured glass, photosensitive glass.

Unit--II

14 Hours

Silicate Industries-2

22. **Ceramics:** Important clays and feldspar. Ceramics-types, uses and manufacture. High technology ceramics and their applications.
23. **Cements:** Classification of cement, ingredients and their role, Manufacture of cement and the setting process, quick setting cements.

Unit-III

10 Hours

Fertilizers

Different types of fertilizers. Manufacture of the following fertilizers: Urea, Ammonium nitrate, Calcium ammonium nitrate, Ammonium phosphates; Polyphosphate, Super phosphate, Compound and mixed fertilizers, Potassium Chloride, Potassium sulphate.

Unit-IV

10 Hours

Alloys

Classification of alloys, Ferrous and Non-Ferrous alloys, Specific properties of elements in alloys. Manufacture of Steel (removal of silicon, decarbonization, demagnetization, desulphurization, dephosphorisation) and surface treatment (argon treatment, heat treatment, nitriding, carburizing). Composition and properties of different types of steels.

Unit-V

14 Hours

Surface Coatings

Objectives of coatings surfaces, preliminary treatment of surface, classification of surface coatings. Paints and pigments-formulation, composition and related properties. Oil paint, modified oils, Pigments, toners and lake pigments, fillers, thinners, enamels, emulsifying agents. Special paints (Heat retardant, Fire retardant,

Eco-friendly paint, Plastic paint), Dyes, Wax polishing, Water and Oil paints, additives, Metallic coatings (electrolytic and electrolysis), metal spraying and anodizing

LIST OF REFERENCE BOOKS

1. E. Stocchi: *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK
2. W. D. Kingery, H. K. Bowen, D. R. Uhlmann: *Introduction to Ceramics*, Wiley Publishers, New Delhi.
3. J. A. Kent: *Riegel's Handbook of Industrial Chemistry*, CBS Publishers, New Delhi.
4. P. C. Jain, M. Jain: *Engineering Chemistry*, Dhanpat Rai & Sons, Delhi.
5. R. Gopalan, D. Venkappayya, S. Nagarajan: *Engineering Chemistry*, Vikas Publications, New Delhi.
6. B. K. Sharma: *Engineering Chemistry*, Goel Publishing House, Meerut
7. S. C. Bhatia: *Chemical Process Industries*, Vol. I & II, CBS Publishers, New Delhi.
8. O. P. Vermani, A. K. Narula: *Industrial Chemistry*, Galgotia Publications Pvt. Ltd., New Delhi.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-': No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	2	3	3	2	2	3	3	3
CO2	2	3	3	3	3	2	1	2	2	3	2	2	3
CO3	3	3	3	2	2	1	1	2	3	1	2	3	3
CO4	2	1	2	1	3	2	3	1	2	3	2	3	2
CO5	3	2	2	2	2	3	2	2	3	2	2	2	2
Avg.	2.5	2.25	2.75	2.0	2.5	1.75	2.0	2.0	2.25	2.25	2.25	2.75	2.75

GOVERNMENT COLLEGE (A), RAJAMAHENDRAVARAM

II B.Sc. INDUSTRIAL CHEMISTRY

SEMESTER – III

Course -08: INORGANIC MATERIALS WEIGHTAGE

TO CONTENT & BLUE PRINT

S.NO.	COURSE CONTENT	LONG ANSWER QUESTIONS	SHORT ANSWER QUESTIONS	TOTAL MARKS	AS PER BLOOMS TAXONOMY
1.	UNIT – I	2	1	17	Understanding, Application
2.	UNIT – II	2	3	20	Remembering, Understanding
3.	UNIT – III	2	1	20	Analyzing, Creation
4.	UNIT – IV	2	1	20	Evaluation, Understanding
5.	UNIT – V	2	2	17	Understanding, Application
	TOTAL	10	8	94	

GOVERNMENT COLLEGE (A), RAJAHMUNDRY
II B.Sc. INDUSTRIAL CHEMISTRY
SEMESTER-III MODEL
PAPER (From 2024-25)
Course - 08: INORGANIC MATERIALS

Time: 2¹/₂ hrs.

Maximum Marks: 50

PART- A

Answer ALL the questions. Each carry SEVEN marks

5 x 7 = 35 M

1. Explain the different steps involved in the manufacturing of glass BT2 CO1 PO1
(OR)
2. Describe the composition and properties of (i) Borosilicate glass (ii) Lead glass BT2 CO1 PO1
3. What are ceramics? Write about different types of ceramics and their properties BT2
CO2 PO2
(OR)
4. Describe steps in the manufacturing of Portland cement BT1 CO2 PO2
5. Explain about different types of fertilizers BT2 CO3 PO3
(OR)
6. Explain the manufacturing of (i) Urea and (ii) Super Phosphate BT2 CO3 PO3
7. Write a note on desulphurization and dephosphorization of steel BT1 CO4 PO4
(OR)
8. Describe the composition and properties of different types of steels BT3 CO4 PO4
9. What are metal coatings. Differentiate between electrolytic and electroless coatings BT2 CO5
PO5
(OR)
10. Explain in detail about special paints BT3 CO5 PO5

PART- B

Answer any FIVE of the following questions. Each carry THREE marks 5 x 3 = 15 M

11. Write a note on composition and properties of colored glass BT1 CO1 PO1
12. Describe about important clays BT2 CO2 PO2
13. Write the applications of High technology ceramics? BT2 CO2 PO2
14. What are quick setting cements? Explain briefly BT3 CO3 PO3
15. How do you distinguish compound fertilizers from mixed fertilizers? Explain briefly BT1 CO3 PO3
16. What are ferrous and non-ferrous alloys? Explain briefly BT3 CO4 PO4
17. Write a note on 'oil paints' BT2 CO4 PO5
18. Describe in brief about water paints BT1 CO5 PO5

GOVERNMENT COLLEGE (A), RAJAHMUNDRY II B.Sc.

INDUSTRIALCHEMISTRY

SEMESTER – III

Course:8

QUESTION BANK

VERY SHORT QUESTIONS:

1. what is ceramics?
2. define clay.
3. What are types of Paints.
4. How special paints useful in industry?
5. Ingredients in cement'
6. Compare Ceramics and Cement
7. Define Glass

SHORT QUESTIONS:

1. Write a note on composition and pro colored glassaass
2. Describe about important clays
3. Write the applications of High techn ceramics?
4. What are quick setting cements? Exp
5. How do you distinguish compound f from mixed fertilizers? Explain briefly
6. What are ferrous and non-ferrous all Explain briefly
7. Write a note on 'oil paints'
8. Describe in brief about water paints

LONG ANSWER QUESTIONS:

1. Explain the different steps involved in the manufacturing of glass
2. Describe the composition and properties of (i) Borosilicate glass (ii) Lead glas.
3. What are ceramics? Write about different types of ceramics and their **properties.**
4. Describe steps in the manufacturing of Portland cement

5. **Explain about different types of fertilizers**
6. **Explain the manufacturing of (i) Urea and (ii) Super Phosphate**
7. **Write a note on desulphurization and dephosphorization of steel**
8. **Describe the composition and properties of different types of steels**
9. **What are metal coatings. Differentiate between electrolytic and electroless coatings**
10. **Explain in detail about special paints**

	Government College (Autonomous) Rajahmundry	Program & Semester			
Course Code C8P	TITLE OF THE COURSE Course -8: INORGANIC MATERIALS LAB	II B.Sc. INDUSTRIAL CHEMISTRY (SEMESTER – III)			
Teaching	Hours Allocated: 30 (Practical)	L	T	P	C
Pre-requisites	Preparation of standard solutions and handling of laboratory apparatus	-	-	2	1

Course Objectives:

24. To provide hands-on experience in determining free acidity in fertilizers
25. To train the students in performing experiment and estimation of calcium in ammonium fertilizers
26. To train students with skills in analysis of cement
27. To equip students with the skills necessary to estimate phosphoric acid in super phosphate fertilizers

Course Outcomes:

On Completion of the course, the students will be able to	
CO1	Determine the free acidity in a given ammonium sulphate fertilizer
CO2	Estimate calcium present in Calcium ammonium nitrate fertilizer.
CO3	Carry out the analysis of cement
CO4	Estimate phosphoric acid in superphosphate fertilizer.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	-
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Practical Syllabus:

50 M

1. Determination of free acidity in ammonium sulphate fertilizer.
2. Estimation of Calcium in Calcium ammonium nitrate fertilizer.
3. Estimation of phosphoric acid in superphosphate fertilizer.
4. Analysis of Cement.

CO-PO Mapping:**1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], 4: (No Correlation)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	2	2	2	3	2	2	3	3
CO2	3	3	3	2	3	2	2	3	2	3	3	3	3
CO3	3	2	3	2	3	1	2	2	2	2	2	3	2
CO4	3	3	2	1	3	2	2	1	2	3	3	3	3
CO5	3	3	3	2	2	2	2	2	2	3	2	3	3
Avg.	3	2.75	2.75	2	3	2	2	2	2.25	2.5	2.5	3	2.75

	Government College (Autonomous) Rajahmundry	Program & Semester II B.Sc. CHEMISTRY (SEMESTER – IV)			
Course Code 9	TITLE OF THE COURSE Course -9: SPECTROSCOPY				
Teaching	Hours Allocated: 45 (Theory) (3 hrs. / Wk.)	L	T	P	C
Pre-requisites:	Basic knowledge about spectrum and its classification	3	-	-	3

Course Objectives:

1. To inculcate basic knowledge on basic concepts like Beer-Lambert's law
2. To understand the concept of Spectroscopy
3. To illustrate the classification of spectroscopies
4. To provide knowledge and applications on various spectroscopies

Course Outcomes:

On Completion of the course, the students will be able to-		Cognitive Domain
CO1	Understand the basic governing law of spectroscopy – Beer lamberts law and interaction of electromagnetic radiation with matter	Knowledge
CO2	Learn Principles of Electronic, IR and NMR spectroscopies	Understand
CO3	Understand Applications of Electronic, IR and NMR spectroscopies	Application
CO4	Applying principles of various spectroscopies to various organic compounds	Application

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	
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Syllabus:

UNIT-I

GENERAL FEATURES OF ABSORPTION

Beer-Lambert's law and its limitations, transmittance, Absorbance, and molar absorptivity. Single and double beam spectrophotometers. Application of Beer-Lambert law for quantitative analysis of 1. Chromium in $K_2Cr_2O_7$ 2. Manganese in Manganous sulphate

UNIT-II

ELECTRONIC SPECTROSCOPY:

Interaction of electromagnetic radiation with molecules and types of molecular spectra. Energy levels of molecular orbitals (σ , π , n). Selection rules for electronic spectra. Types of electronic transitions in molecules. Concept of chromophore and auxochrome. Bathochromic shift, Hypsochromic shift, hyper chromic shift, hypochromic shift. Effect of conjugation on λ_{max} .

UNIT-III

INFRA RED SPECTROSCOPY:

Different Regions in Infrared radiations. Modes of vibrations in diatomic and polyatomic molecules. Characteristic absorption bands of various functional groups. Interpretation of spectra- Alkanes, Aromatic, Alcohols carbonyls, and amines with one example to each. Functional group and fingerprint Region.

UNIT-IV

PROTON MAGNETIC RESONANCE SPECTROSCOPY (1H -NMR)

Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals - spin-spin coupling, coupling constants.

UNIT-V

APPLICATIONS

Applications of NMR, IR and λ_{max} of UV vis spectroscopies with suitable examples - ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromo ethane, ethyl acetate, toluene and acetophenone

List of Reference Books:

5. Spectroscopy by William Kemp
6. Spectroscopy by Pavia
7. Organic Spectroscopy by J. R. Dyer
8. Elementary organic spectroscopy by Y.R. Sharma
9. Spectroscopy by P.S. Kalsi
10. Organic spectroscopy by Jagmohan

CLO-PLO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-': No Correlation)

	CL O\P LO	PL O1	PL O2	PL O3	PL O4	PL O5	PL O6	PL O7	PL O8	PLO 9	PLO1 0	CLO \PLO	PLO1
CLO1	3	2	3	2	2	2	3	3	2	2	3	3	3
CLO2	2	3	3	3	3	2	1	2	2	3	2	2	3
CLO3	3	3	3	2	2	1	1	2	3	1	2	3	3
CLO4	2	1	2	1	3	2	3	1	2	3	2	3	2
CLO5	2.5	2.25	2.75	2.0	2.5	1.75	2.0	2.0	2.25	2.25	2.25	2.75	2.75

GOVERNMENT COLLEGE (A), RAJAMAHENDRAVARAM
II B.Sc. ORGANIC CHEMISTRY (Hons.) SEMESTER-III 2024-25
CHEMISTRY COURSE-9:PHYSICAL CHEMISTRY
QUESTION PAPER BLUE PRINT

TIME: 2½ hrs.

MAX. MARKS: 50

PART – A

Answer **ALL** the following questions.

5x7 = 35 M

- 1a Question from UNIT-I
OR
1b Question from UNIT-I
2a Question from UNIT-II
OR
2b Question from UNIT-II
3a Question from UNIT-III
OR
3b Questions from UNIT-III
4a Question from UNIT-IV
OR
4b Question from UNIT-IV
5a Question from UNIT-V
OR
5b Question from UNIT-V

PART – B

Answer any **FIVE** of the following questions.

5x3 = 15 M

- 6 Questions from UNIT-I
7 Questions from UNIT-II
8 Questions from UNIT-III
9 Questions from UNIT-IV
10 Questions from UNIT- V
11 Questions from UNIT-II
12 Questions from UNIT-III
13 Questions from UNIT- IV

GOVERNMENT COLLEGE (A), RAJAHMUNDRI B.Sc.
ORGANIC CHEMISTRY

SEMESTER-IV
MODEL PAPER (From 2024-25)
Course - 9: SPECTROSCOPY

Time: 2½ hrs

Max. Marks: 50

PART- A

Answer ALL the questions. Each carry SEVEN marks

5 x 7 = 35 M

GOVERNMENT COLLEGE (A), RAJAMAHENDRAVARAM
II B.Sc. ORGANIC CHEMISTRY, SEMESTER-IV 2024-25
CHEMISTRY COURSE-9: SPECTROSCOPY

MODEL QUESTION PAPER

TIME: 2½ hrs.

MAX. MARKS: 50

PART – A

Answer ALL the following questions.

5x7 = 35

1a Define Absorbance, transmittance, and molar absorptivity. State and explain Beer-Lambert law.

OR

1b Give the experimental procedure of simultaneous determination of chromium in potassium dichromate and manganese in Manganous Sulphate using Beer-Lambert's law.

2a Classify molecular spectra and selection rules for the formation of spectra.

OR

2b Define Chromophore and auxochrome. How does the conjugation, affect the λ_{max} .

3a Explain the Fingerprint region. Explain its significance with an example. Write IR spectral data for any one alcohol, aldehyde and ketone.

OR

Marks	BL	CLO	PLO	PI
7	2	2	1	
7	2	2	2	
7	2	1	2	
7	2	3	2	
7	5	1	7	
7	2	2	5	
7	4	1	3	
7	3	4	2	

- 3b Discuss different modes of vibrations in IR spectroscopy.
- 4a Give a detailed explanation on the principle of NMR spectroscopy. What is a chemical shift equivalence?

OR

- 4b Describe the role of equivalent and non-equivalent protons in NMR spectroscopy.
- 5a How many different NMR signals you will see in the following molecules? Ethanol, Ethyl Acetate, toluene and Acetophenone.

7	6	5	5	
7	3	3	4	

OR

- 5b Describe the applications of UV – Vis and IR spectroscopies in structure determination of organic compounds.

PART – B

Answer any **FIVE** of the following questions.

5x3 = 15 M

	Marks	BL	CLO	PLO	PI
1. Discuss single and double-beam spectrophotometers.	3	1	1	1	
2. Illustrate different shifts in UV – Vis Spectroscopy.	3	2	1	2	
3. Write a short note on different regions in IR.	3	2	1	3	
4. Explain about spin-spin coupling in NMR.	3	6	3	5	
5. Write any two applications of UV- Vis spectroscopy with examples	3	5	3	7	
6. Explain types of electronic transitions in UV – Vis Spectroscopy.	3	2	5	2	
7. Write IR stretching frequencies of alkanes and amines.	3	4	4	3	
8. Define coupling constant with examples.	3	5	4	3	

GOVERNMENT COLLEGE (A), RAJAMAHENDRAVARAM
II B.Sc. ORGANIC CHEMISTRY, SEMESTER-IV 2024-25
CHEMISTRY COURSE-9: SPECTROSCOPY


QUESTION BANK

Essay Questions

1. Define Absorbance, transmittance, and molar absorptivity. State and explain Beer-Lambert law
2. Give the experimental procedure of simultaneous determination of chromium in potassium dichromate and manganese in Manganous Sulphate using Beer-Lambert's law.
3. Explain types of molecular spectra and selection rules for the formation of spectra.
4. Write about different energy levels of Electronic spectroscopy.
5. Define Chromophore and auxochrome. How does the conjugation, affect the λ_{\max} .
6. Write about characteristic absorption bands of various functional groups.
7. Explain the Fingerprint region. Explain its significance with an example. Write IR spectral data for any one alcohol, aldehyde and ketone.
8. Explain Functional group and finger print regions.
9. Discuss different modes of vibrations in IR spectroscopy.
10. Give a detailed explanation on the principle of NMR spectroscopy. What is a chemical shift equivalence?
11. Describe the role of equivalent and non-equivalent protons in NMR spectroscopy.
12. Explain the position of signals.
13. How many different NMR signals you will see in the following molecules? Ethanol, Ethyl Acetate, toluene and Acetophenone.
14. Explain the applications of UV – Vis and IR spectroscopies in structure determination of organic compounds.
15. Application of NMR to ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromo ethane, ethyl acetate, toluene and acetophenone.

Short Answer Questions

16. Discuss single and double-beam spectrophotometers.
17. Write briefly about different shifts in UV – Vis Spectroscopy.
18. Explain types of electronic transitions in UV – Vis Spectroscopy.
19. Write a short note on different regions in IR.
20. Write IR stretching frequencies of alkanes and amines.
21. Explain about spin-spin coupling in NMR.
22. Define principle of NMR.
23. Define coupling constant with examples.
24. Write any two applications of UV- Vis spectroscopy with examples.

	Government College (Autonomous) Rajahmundry	Program & Semester			
Course Code 9	TITLE OF THE COURSE Course 9: SPECTROSCOPY	II B.Sc. ORGANIC CHEMISTRY (SEMESTER – IV)			
Teaching	Hours Allocated: 30 (Practical)	L	T	P	C
Pre-requisites	Preparation of standard solutions and handling of laboratory apparatus and instruments	-	-	2	1

Course Objectives:

- To demonstrate basic knowledge about the handling of laboratory apparatus
- To illustrate knowledge about the preparation of standard solutions
- To provide hands-on training for the determination of different organic compounds

Course Outcomes:

On Completion of the course, the students will be able to	
CO1	Learn to Handle and calibrate the common laboratory glass apparatus and instruments
CO2	Get practical skill to the preparation of different standard solutions used for quantitative analysis
CO3	Identify and confirm the structure of a given organic compounds
CO4	Principles and applications of different molecular spectra

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	-
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IR spectral analysis of the following functional groups with examples

Hydroxyl Groups

Carbonyl Groups


Amino Groups

Aromatic Groups

CLO-PLO Mapping:

1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], 4: (No Correlation)

	CL OP LO	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO1 0	CLO\ PLO	PLO1
CLO1	3	3	3	2	3	2	2	2	3	2	2	3	3
CLO2	3	3	3	2	3	2	2	3	2	3	3	3	3
CLO3	3	2	3	2	3	1	2	2	2	2	2	3	2
CLO4	3	3	2	1	3	2	2	1	2	3	3	3	3
CLO5	3	2.75	2.75	2	3	2	2	2	2.25	2.5	2.5	3	2.75

	Government College (Autonomous) Rajahmundry	Program & Semester II B.Sc. CHEMISTRY (H), ORG CHEMISTRY, ANALYTICAL CHEMISTRY & INDUSTRIAL CHEMISTRY (SEMESTER – IV)			
Course Code	TITLE OF THE COURSE Course -10: PHYSICAL CHEMISTRY-II				
Teaching	Hours Allocated: 45 (Theory) (3 hrs. / Wk.)	L	T	P	C
Pre-requisites:	Basic knowledge about material and energy balances	3	-	-	3

Course Objectives:

- To provide basic knowledge on Colligative Properties
- To provide basic awareness on concepts of electrochemistry
- To understand the basic concepts of Electrodes and their usage
- To provide knowledge and understand ability on phase systems
- To Provide the knowledge on photochemistry

Course Outcomes:

On Completion of the course, the students will be able to-		Cognitive Domain
CO1	Understand the concept of Colligative Properties.	Knowledge and Application
CO2	Understand the basic concepts of electrochemistry	Knowledge
CO3	Understand the basic concepts of Electrodes and their usage	Understand and application
CO4	To understand basic concepts of phase rule	Application
CO5	Understand the laws of photochemistry and learn how to calculate the quantum yields of different photo physical processes	Knowledge

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	
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SYLLABUS

UNIT-I DILUTE SOLUTIONS

Colligative properties. Raoult's law, relative lowering of vapour pressure, its relation to molecular weight of non-volatile solute. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. osmotic pressure, experimental determination. Theory of dilute solutions. Determination of molecular weight of non-volatile solute from osmotic pressure. Abnormal Colligative properties- Van't Hoff factor.

UNIT-II ELECTROCHEMISTRY-I

Specific conductance, equivalent conductance. Variation of equivalent conductance with dilution. Migration of ions, Kohlrausch's law. Arrhenius theory of electrolyte dissociation and its limitations. Ostwald's dilution law. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Definition of transport number, determination by Hittorfs method. Application of conductivity measurements- conductometric titrations.

UNIT-III ELECTROCHEMISTRY-II

Single electrode potential, sign convention, Reversible and irreversible cells Nernst Equation- Reference electrode, Standard Hydrogen electrode, calomel electrode, Indicator electrode, metal – metal ion electrode, Inert electrode, Determination of EMF of cell, Applications of EMF measurements - Potentiometric titrations.

UNIT-IV PHASE RULE

Concept of phase, components, degrees of freedom. Thermodynamic Derivation of Gibbs phase rule. Phase equilibrium of one component system - water system. Phase equilibrium of two- component system, solid-liquid equilibrium. Simple eutectic diagram of Pb-Ag system, simple eutectic diagram, desilverisation of lead., NaCl-Water system, Freezing mixtures.

UNIT-V PHOTOCHEMISTRY

Difference between thermal and photochemical processes. Laws of photochemistry- Grothus- Draper's law and Stark-Einstein's law of photochemical equivalence. Quantum yield-Photochemical reaction mechanism- hydrogen- chlorine, hydrogen- bromine reaction. Qualitative description of fluorescence, phosphorescence, Photosensitized

LIST OF REFERENCE BOOKS

Modern Electrochemistry by J.O. M. Bockris and A.K.N.Reddy

Advanced Physical Chemistry by Atkins

Introduction to Electrochemistry by S. Glasstone

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-': No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	2	3	3	2	2	3	3	3
CO2	2	3	3	3	3	2	1	2	2	3	2	2	3
CO3	3	3	3	2	2	1	1	2	3	1	2	3	3
CO4	2	1	2	1	3	2	3	1	2	3	2	3	2
Avg.	2.5	2.25	2.75	2.0	2.5	1.75	2.0	2.0	2.25	2.25	2.25	2.75	2.75

GOVERNMENT COLLEGE (A), RAJAMAHENDRAVARAM

**II B.Sc. CHEMISTRY (H), ORG CHEMISTRY, ANALYTICAL CHEMISTRY & INDUSTRIAL
CHEMISTRY**

SEMESTER – IV

**Course -10: PHYSICAL CHEMISTRY-II WEIGHTAGE
TO CONTENT & BLUE PRINT**

S.NO.	COURSE CONTENT	LONG ANSWER QUESTIONS	SHORT ANSWER QUESTIONS	TOTAL MARKS	AS PER BLOOMS TAXONOMY
1.	UNIT - I	2	1	17	Understanding, Application
2.	UNIT – II	2	2	20	Remembering, Understanding
3.	UNIT – III	2	2	20	Analyzing, Creation
4.	UNIT – IV	2	2	20	Evaluation, Understanding
5.	UNIT - V	2	1	17	Understanding, Application
	TOTAL	10	8	94	

GOVERNMENT COLLEGE (A), RAJAHMUNDRY
II B.Sc. CHEMISTRY (H), ORG CHEMISTRY, ANALYTICAL CHEMISTRY & INDUSTRIAL CHEMISTRY
SEMESTER-IV
MODEL PAPER (From 2024-25) Course -
10: PHYSICAL CHEMISTRY-II

Time: 2½ hrs.

Maximum Marks: 50

PART-A

Answer ALL the questions. Each carry SEVEN marks

5 x 7 = 35 M

- i. What is elevation in boiling point and derive the relation between molecular weight of solute and elevation in boiling point? BT2 CO1 PO1

(OR)

- ii. Define osmotic pressure and explain their experimental determination? BT2 CO1 PO1
Explain Arrhenius theory of dissociation and its limitations BT2 CO2 PO2

- iii. Define the transport number and determine the transport number by Hittorf's method BT1 CO2 PO2

OR

- d. Derive the Nernst equation BT2 CO3 PO3

(OR)

- e. Describe the following electrodes (a) Calomel electrode (b) Indicator electrode BT2 CO3 PO3

Derive the Gibbs phase rule? BT1 CO4 PO4

(OR)

- f. Explain phase diagram of Pb-Ag System BT3 CO4 PO4

- g. Describe the laws of photo chemistry BT2 CO5 PO5


(OR)

- h. Derive the quantum yield of Hydrogen chlorine photochemical reaction through mechanism BT3 CO5 PO5

PART-B

Answer any FIVE of the following questions. Each carry THREE marks 5 x 3 = 15 M

11. Why ethylene glycol used as an antifreeze explain? BT1 CO1 PO1
12. Explain the Kohlrausch law BT2 CO2 PO2
13. How does dilution effect the conductivity of electrolyte solution? BT2 CO2 PO2
14. How does the standard hydrogen electrode (SHE) serve as reference point for measuring electrode potentials? BT3 CO3 PO3
15. Explain how a metal-metal ion electrode works? BT1 CO3 PO3
16. How does pressure influence the phase equilibrium of water? BT3 CO4 PO4
17. How is the eutectic point utilized in the desilverisation process? BT2 CO4 PO5
18. Define fluorescence and phosphorescence? BT1 CO5 PO5

	Government College (Autonomous) Rajahmundry	Program & Semester			
Course Code	TITLE OF THE COURSE Course -10: PHYSICAL CHEMISTRY LAB	II B.Sc. CHEMISTRY (H), ORG CHEMISTRY, ANALYTICAL CHEMISTRY & INDUSTRIAL CHEMISTRY (SEMESTER – IV)			
Teaching	Hours Allocated: 30 (Practical)	L	T	P	C
Pre-requisites	Preparation of standard solutions and handling of laboratory apparatus	-	-	2	1

Course Objectives:

- To provide hands-on experience in determining the CST of the phenol-water system through laboratory experiments.
- To guide students in designing and conducting experiments to study the effect of NaCl on the CST and analyze the resultant data.
- To train students in performing conductometric titrations using standard NaOH solutions for the accurate determination of HCl concentration.
- To equip students with the skills necessary to conduct conductometric titrations to determine the concentration of CH₃COOH using standard NaOH solutions.

Course Outcomes:

On Completion of the course, the students will be able to

CO1	Analyze the phase behavior of the phenol-water system at different temperatures and concentrations.
CO2	Predict and explain the shifts in CST due to the addition of NaCl to the phenol-water system.
CO3	Develop the skills to perform conductometric titrations using standard NaOH solutions.
CO4	Interpret conductometric titration curves and derive accurate concentrations of CH ₃ COOH from experimental data

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	-
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Practical Syllabus:

50 M

Critical solution temperature of phenol-water system

Effect of NaCl on CST (phenol water system)


Determination of concentration of HCl conductometrically using standard NaOH Solutions

Determination of concentration of CH₃COOH conductometrically using standard NaOH Solutions

CO-PO Mapping:

1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], 4: (No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	2	2	2	3	2	2	3	3
CO2	3	3	3	2	3	2	2	3	2	3	3	3	3
CO3	3	2	3	2	3	1	2	2	2	2	2	3	2
CO4	3	3	2	1	3	2	2	1	2	3	3	3	3
Avg.	3	2.75	2.75	2	3	2	2	2	2.25	2.5	2.5	3	2.75

	Government College (Autonomous) Rajahmundry	Program & Semester			
Course Code C11	TITLE OF THE COURSE COSMETICS, FERMENTATION, FOODADDITIVES, SUGAR AND INDUSTRIAL POLLUTION	B.Sc. INDUSTRIAL CHEMISTRY(HONS) (IV Semester)			
Teaching	Hours Allocated: 60 (Theory)	L	T	P	C
Pre-requisites	Introduction to Sucrose, Fermentation and names of some daily used cosmetics	3	1	-	3

Course Objectives:

1. To provide basic knowledge about preparation of cosmetics.
2. To give knowledge about Fermentation
 3. To provide knowledge on food flavors, colors and preservatives.
4. To provide knowledge and awareness on industrial pollutants.

Course Outcomes:

On Completion of the course, the students will be able to		Cognitive Domain
CO1	Get awareness on the preparation and uses of important cosmetics	Understanding
CO2	Get awareness on the aerobic, anaerobic fermentation processes and practical skill in the production of chemicals by fermentation process.	Skill
CO3	Get knowledge on Food additives and practical skill in the manufacture of sugar	Skill
CO4	Get awareness on the manufacture of Sucrose and understanding about different types of pollutants.	Understanding

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	
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SYLLABUS

UNIT – I: COSMETICS AND PERFUMES

9 hrs.

A general study including preparation and uses of the following: Hair dye, hairspray, Shampoo, Suntan lotions, face powder, lipsticks, talcum powder, nail enamel, creams (cold, vanishing and shaving creams), antiperspirants and artificial flavors. Essential oils and their importance in cosmetic industries with reference to Eugenol, Geraniol, sandalwood oil, eucalyptus, rose oil, phenylethyl alcohol, Jasmone, Civetone, and Muscone.

UNIT – II: FERMENTATION INDUSTRIES & SUGAR CHEMISTRY

9 hrs.

Aerobic and anaerobic fermentation. Production of (i) Ethyl alcohol and citric acid, (ii) Antibiotics; Penicillin and Streptomycin, (iii) Lysine and Vitamin C.

UNIT – III: SUGAR CHEMISTRY

9 hrs.

Introduction –

Manufacture of sugar from sugarcane. Manufacture and recovery of sugar from molasses, manufacture of sucrose from beet root, testing and Quantitative estimation of sugar.

UNIT – IV: FOOD ADDITIVES

9 hrs.

A general study of food flavors- Flavoring agents: Vanilla, diacetyl, isoamyl acetate, limonene, ethyl propionate, allyl hexanoate. Colours: Brilliant blue FCF, fast green FCF, tetrazine, erythrosine, sunset yellow FCF and preservatives; Sodium carbonate, sodium benzoate, sorbic acid and artificial sweeteners.

UNIT – V: INDUSTRIAL POLLUTION

9 hrs.

Pollutants and their statutory limits Air Pollution- various pollutants

Water pollution- Organic and Inorganic pollutants

Noise pollution

Text books:

1. E. Stocchi: *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK

2. J. A. Kent: *Riegel's Handbook of Industrial Chemistry*, CBS Publishers, New Delhi.

Reference books:

5. P. C. Jain, M. Jain: *Engineering Chemistry*, Dhanpat Rai & Sons, Delhi.

6. Practical's and Calculation in Engineering Chemistry – S.S. Dara
7. A. K. De, *Environmental Chemistry*: New Age International Pvt, Ltd, New Delhi.
8. S.P. MAHAJAN: *Pollution control in process industries*, Tata McGraw-Hill publishing Company limited, New Delhi.
9. C. k. Varshney: *Water Pollution and Management*, Wiley Eastern Limited, Chennai.

CLO-PLO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-' : No

Correlation)

CLO/ PLO	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10
CLO1	3	2	3	2	2	0	0	0	2	0
CLO2	2	3	3	2	3	0	0	0	3	0
CLO3	3	3	3	2	2	0	0	0	3	0
CLO4	2	3	2	1	3	0	0	0	2	0
Avg.	2.5	2.75	2.75	1.75	2.5	0	0	0	2.25	0

Proposed activities:

Skill Development:

10. Preparation of Talcum powder, nail polish and face cream.
11. Analysis of oil and Fat.

Employability:

1. Testing of turmeric powder, milk and mustard oil for adulterants.
2. Estimation of glucose in food samples.

Entrepreneurship:

1. Analysis of oils and fats (iodine value, saponification value, acid value)

GOVERNMENT COLLEGE (A), RAJAMAHENDRAVARAM

**INDUSTRIAL CHEMISTRY, SEM IV COSMETICS,
FERMENTATION, FOODADDITIVES,
SUGAR AND INDUSTRIAL POLLUTION**

MODEL PAPER (2024-25)

TIME: 2¹/₂ hr.

MARKS: 50 M

SECTION - A

Answer ALL the questions

(5 X 7 = 35 M)

1(a). Any One Question from Unit -I
(OR)

1(b). Any One Question from Unit -I

2(a). Any One Question from Unit -II
(OR)

2(b). Any One Question from Unit -II

3(a). Any One Question from Unit -III
(OR)

3(b). Any One Question from Unit -III

4(a). Any One Question from Unit -IV
(OR)

4(b). Any One Question from Unit -IV

5(a). Any One Question from Unit -V
(OR)

5(b). Any One Question from Unit -V

SECTION-B

Answer any FIVE of the following

(5 X 3 = 15 M)

1. Any One Question from Unit –I
2. Any Question from Unit –I
3. Any Question from Unit –II
4. Any Question from Unit –III
5. Any Question from Unit –III
6. Any Question from Unit –IV
7. Any Question from Unit –IV
8. Any Question from Unit –V

**GOVERNMENT COLLEGE (A), RAJAMAHENDRAVARAM
INDUSTRIAL CHEMISTRY, SEM IV**

MODEL QUESTION PAPER

TIME: 2½ hrs.

MAX. MARKS: 50

PART – A

Answer **ALL** the following questions.

5x7 = 35 M

	Marks	BL	CLO	PLO	PI
1a What are essential oils? Describe the importance of Jasmone and Muscone.	7	1	1	2	
OR					
1b List out the preparation and uses of Sun-tan lotions and vanishing creams.	7	4	2	2	
2a Explain the production of ethyl alcohol by fermentation process.	7	2	1	3	
OR					
2b Explain the production of penicillin & streptomycin by fermentation process.	7	2	3	3	
3a Explain the manufacture of sugar from molasses.	7	2	1	3	
OR					
3b Explain the manufacture of sucrose from beat root.	7	6	2	2	
4a Discuss the following food colors i) Brilliant blue FCF and ii) Erythrosine.	7	2	2	3	
OR					
4b Write a note on the following food preservatives i) sodium benzoate and ii) sorbic acid.	7	1	5	10	
5a What are the primary and Secondary air pollutants? Give examples.	7	3	4	10	
OR					
5b Write a note on organic pollutants in water.					

PART – B

Answer any **FIVE** of the following questions.

1. Discuss the importance of rose oil.
2. Write the uses of artificial flavors.
3. Differentiate between aerobic and anaerobic fermentation.
4. How sucrose is estimated.
5. Write a note on flavoring agent 'Vanilla'.
 - 1 Summarize the food preserving agents.
 - 1 Discuss water pollutants.
 - 2
 - 1 Explain the causes for air pollution.
 - 3

5x3 = 15 M

Marks	BL	CLO	PLO	PI
3	6	1	1	
3	3	2	2	
3	4	3	3	
3	4	5	3	
3	3	4	1	
3	2	2	1	
3	6	4	1	
3	2	4	1	
			0	
			0	

GOVERNMENT COLLEGE (A),RAJAMAHENDRAVARAM

II B.Sc. INDUSTRIAL CHEMISTRY SEMESTER -IV

1 Cosmetics, Fermentation, Food additives, Sugarchemistry and Industrial Pollution


QUESTION BANK ESSAY QUESTIONS: 07M

- Write the preparation and uses of Sun-tan lotions and vanishing creams.
- What are essential oils? Describe the importance of Jasmone and Muscone.
- Explain the production of ethyl alcohol by fermentation process.
- Describe the production of Penicillin by fermentation process.
- Write a note on the following food colors i) Brilliant blue FCF and ii) Erythrosine.
- Write a note on the following food preservatives i) sodium benzoate and ii) sorbic acid.
- Explain the manufacture of sugar from molasses.
- Explain the manufacture of sucrose from beat root.
- Explain point and nonpoint sources of air pollution. What are the primary and Secondary air pollutants? Give examples.
- Write a note on organic pollutants in water.

QUESTION BANK SHORT

ANSWER QUESTIONS –04 MARKS:

1. Write the uses of artificial flavors.
2. Describe the importance of rose oil.
3. Differentiate between aerobic and anaerobic fermentation.
4. Write a note on flavoring agent 'Vanilla'.
5. What are artificial sweeteners? Explain briefly.
6. Explain in brief the use of sodium carbonate as food preservative.
7. Describe in brief how sucrose is estimated.
8. Write a note on noise pollution.
9. What is the importance of Eugenol, Geraniol.
10. Write the preparation and uses of Talcum powder and creams.
11. What is Anaerobic fermentation.
 11. Write the production of Vitamin-C.
 12. Write the manufacture of sugar from beet root.
 13. Write about the flavoring agent of Ethyl propionate.
 14. Write about food preservatives.
 15. Write a note on water pollutants.
 16. Write about air pollution.

	Government College (Autonomous) Rajahmundry	Program & Semester			
Course Code C11P	TITLE OF THE COURSE COSMETICS, FERMENTATION, FOODADDITIVES, SUGAR AND INDUSTRIAL POLLUTION (PRACTICAL –III)	II B.Sc. Industrial Chemistry (HONS) (IV Semester)			
Teaching	Hours Allocated: 30 (Practical)	L	T	P	C
Pre-requisites	Introduction to food additives and cosmetics	-	-	2	2

Course Objectives:

1. To provide basic knowledge about analysis of oils and fats.
2. To give knowledge and awareness on food samples.
3. To provide knowledge and practical skill on testing of milk, turmeric powder.

Course Outcomes:

On Completion of the course, the students will be able to	
CO1	Carryout the analysis of a given oil and fat.
CO2	Find out the adulterants in turmeric powder, milk and mustard oil.
CO3	Estimate the glucose present in the food sample.
CO4	Prepare Talcum powder, nail polish and face cream.

Skill Development		Employability		Entrepreneurship	
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**II B.Sc. INDUSTRIAL CHEMISTRY
SEMESTER -IV**

**C11- COSMETICS, FERMENTATION, FOODADDITIVES,SUGAR
AND INDUSTRIAL POLLUTION**

PRACTICAL SYLLABUS

30 Hrs. (02 Hrs. / Wk.)

Analysis of oils and fats (iodine value, saponification value, acid value)

Testing of turmeric powder, milk and mustard oil for adulterants.

Estimation of glucose in food samples.

Preparation of talcum powder, nail polish and face cream

Text books:

E. Stocchi: *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK

J. A. Kent: *Riegel's Handbook of Industrial Chemistry*, CBS Publishers, New Delhi.

Reference books:

P. C. Jain, M. Jain: *Engineering Chemistry*, Dhanpat Rai & Sons, Delhi.

Practical's and Calculation in Engineering Chemistry – S.S. Dara

A. K. De, *Environmental Chemistry*: New Age International Pvt, Ltd, New Delhi.

S.P. MAHAJAN: *Pollution control in process industries*, Tata McGraw-

HillpublishingCompany limited, New Delhi.

C. k. Varshney: *Water Pollution and Management*, Wiley Eastern Limited, Chennai.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-' : No Correlation)

CLO\ PLO	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10
CLO1	3	2	2	3	2	1	0	0	3	0
CLO2	3	2	3	3	3	1	0	0	3	0
CLO3	3	3	3	3	2	1	0	0	3	0
CLO4	3	3	3	3	2	1	0	0	2	0
Avg.	3	2.5	2.75	3	2.25	1	0	0	2.75	0

GOVERNMENT COLLEGE (A), RAJAMAHENDRAVARAM II B.Sc.
INDUSTRIAL CHEMISTRY SEMESTER -IV

C11P -I(PRACTICAL -IV) AT THE END OF SEMESTER -IV SCHEME OF
VALUATION

Time: 03 Hrs.

Max. Marks: 50 M

1. Record ----- 10 Marks

3. Viva - voce ----- 05 Marks

Splitting of Practical Marks : (35M)

i. Procedure in 10 minutes : 5 M

ii. Formula with units : 5 M

iii. Neat tabulation : 5 M

iv. Correct calculation : 5 M

v. Report Error < 1 % : 15 M

1- 2 % : 10 M

>2 % : 5 M
