

# **S.V.K.P & Dr. K.S. RAJU ARTS & SCIENCE COLLEGE**

**(Autonomous)**

**Recognized by UGC as “College with Potential for Excellence(2016-21)”**

**Accredited by NAAC with “A” Grade**

**& ISO Certified Institution (with 3 ISO Certificates)**

**(Affiliated to ADIKAVI NANNAYA UNIVERSITY-Recognized by Govt. of Andhra Pradesh)**

**PENUGONDA – 534320. W.G.DIST.,**

## **DEPARTMENT OF CHEMISTRY (U.G)**



**B.Sc., Chemistry**

**BOS Meeting – VI**

**On 24-08-2024**

**BOARD OF STUDIES**

**2024 – 25**



## S.V.K.P & Dr. K.S. RAJU ARTS & SCIENCE COLLEGE (Autonomous)

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PENUGONDA – 534320. W.G.DIST.A.P. INDIA

Phone No: 08819-246126 Email Id:svkp\_penugonda@rediffmail.com Website : svkpandksrajucollege.edu.in

### Department of Chemistry B.O.S. Meeting-V

The Meeting of the board of Studies in Chemistry is held will be on 24-08-2024 at 10.30 AM in the Department of Chemistry.

Members Present:










S.No.	Name	Designation
1	Dr. Ch. Durga Prasad Head, Dept. of Chemistry SVKP & Dr. KS Raju Arts & Science College(A),Penugonda.	Chairman
2	Dr. G. Ramu, Head of the Department of PG Chemistry, Sir C. R. R. College(A),Eluru. 9441159874, ramug1971@gmail.com	University Nominee
3	Dr. M . David Raju, Dept of Chemistry, P. B. Siddhartha college(A)Vijayawada, N T R Dt, AP. 9963036641, mdavidraju40@gmail.com	Subject Expert
4	Sri S. Anil Dev, Dept of chemistry, D.N.R College(A) Bhimavaram, W.G.Dt., A.P. 8179179899, anildevs1974@gmail.com	Subject Expert
5	Miss. Ch. Rama Lakshmi Lecturer in Chemistry SVKP & Dr. KS Raju Arts & Science College(A),Penugonda.	Member
6	Miss. K. Rajeswari Lecturer in Chemistry SVKP & Dr. KS Raju Arts & Science College(A),Penugonda	Member
7	Smt. B. Radha Devi Lecturer in Chemistry SVKP & Dr. KS Raju Arts & Science College(A),Penugonda	Member
8	Dr. D. Chandra Sekhar, Assistant Professor. Dept. of Engineering Chemistry, SRKR Engineering College, Bhimavaram, W.G.Dt., A.P. 9290886820, chandu1884@gmail.com	Representative from Industry
9	Sri. G. Abhiram Krishna, Jr Lecturer in Chemistry, S.V.K.P& P.V Juniour College, Penugonda, W.G.Dt., A.P. 7382015846, abhiramkrishna83@gmail.com	Alumni

**Agenda:**

1. To frame the Syllabus, Blue print and Model Question Papers (Theory and Practical) for III and IV semesters of Second year (w.e.f.2023 - 2024 admitted batch) for the Academic year 2024-25, for External and Internal examinations.
2. To discuss about the ratio of CIA (Continues Internal Assessment) and SEE (Semester End Examinations) from the present ratio 25:75 to 30:70 for the 2023-24 admitted batch onwards.
3. To Coordinate Teaching, Research, Extension and other Academic Activities in the Department.
4. To suggest innovative teaching methods.
5. To submit proposal for conducting Seminars, Workshops etc.
5. To prepare syllabus for certificate/add on programs.
6. To prepare a list of examiners for paper setting.
7. Any other matter.

**Resolution:**

1. Discussed and recommended that no changes are required in the proposed syllabi, Blue Print and Model Question papers for Theory and Practical for both External and Internal Examinations for III and IV semester for the admitted batch 2023-24 for the academic year 2024-2025.
2. Discussed and recommended that the ratio of CIA (Continues Internal Assessment) and SEE (Semester End Examinations) from the present ratio 25:75 to 30:70 for the 2023-24 admitted batch onwards.
3. Faculty of the Department are advised to concentrate on Research work and Extension Activities by attending Seminars, Workshops and Guest Lectures etc.
4. Faculty of the Department are advised to use more ICT methods.
5. It is resolved to send proposals to UGC or any other funding agency for National Seminar/Workshops etc.
6. Resolved to approve the syllabus for certificate/add on programs.
7. It is resolved to approve the list of examiners prepared.

S.No.	Name	Designation	Signature
1	Dr. Ch. Durga Prasad Head, Dept. of Chemistry SVKP & Dr. KS Raju Arts & Science College(A), Penugonda.	Chairman	
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6	Miss. K. Rajeswari Lecturer in Chemistry SVKP & Dr. KS Raju Arts & Science College(A), Penugonda	Member	
7	Smt. B. Radha Devi Lecturer in Chemistry SVKP & Dr. KS Raju Arts & Science College(A), Penugonda	Member	
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### III -SEMESTER

#### Course Code 5: FUNDAMENTALS IN ORGANIC CHEMISTRY

Credits: 03

#### Course outcomes:

At the end of SEMESTER the student will be able to

1. Understand and explain the differential behaviour of organic compounds based on fundamental concepts learnt.
2. Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved.
3. Learn and identify many organic reaction mechanisms .
4. Correlate and describe the stereo-chemical properties of organic compounds and reactions.

#### Syllabus:

##### Unit 1. Structural theory in Organic Chemistry (9 h)

Types of bond fission and organic reagents (Electrophilic, Nucleophilic, and free radical reagents). Reaction intermediates – Carbocations, carbanions & free radicals. Bond polarization: Factors influencing the polarization of covalent bonds, 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.

Additional Inputs : Types of Organic reactions

## **Unit II Saturated Hydrocarbons (Alkanes and Cycloalkanes) 9 h**

General methods of preparation of alkanes- Wurtz and Wurtz Fittig reaction, Corey House synthesis, physical and chemical properties of alkanes, Conformational analysis of alkanes (Conformations, relative stability and energy diagrams of Ethane, Propane and butane).

General molecular formulae of cycloalkanes and relative stability, Baeyer strain theory, Cyclohexane conformations with energy diagram, Conformations of monosubstituted cyclohexane.

Additional Inputs : Preparation of cycloalkanes by Freund's method, Wislicenus method, Sachse and Mohr predictions theory.

## **UNIT-III Unsaturated Hydrocarbons (Alkenes and Alkynes) 9 h**

General methods of preparation, physical and chemical properties, Saytzeff and Hoffmann eliminations (with mechanism), Electrophilic Additions, ( $H_2$ , HX) mechanism (Markownikoff/ Antimarkownikoff addition) with suitable examples-syn and anti-addition;

addition of  $X_2$ , HX. Oxymercuration demercuration, ozonolysis, hydroxylation, Diels Alder reaction, 1,2- and 1,4-addition reactions in conjugated dienes. Reactions of alkynes; acidity, electrophilic and nucleophilic additions, hydration to form carbonyl compounds, Alkylation of terminal alkynes.

Additional Inputs : Dienes - Types of dienes

## **UNIT-IV Benzene and its reactivity (9 h)**

Structure of Benzene – Preparation - polymerisation of acetylene and decarboxylation- Properties -mechanism of electrophilic aromatic substitution of Friedel- Craft's alkylation and acylation. halogenation and nitration,

## **UNIT-V Orientation of aromatic substitution (9 h)**

Concept of aromaticity, Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation) Orientation of aromatic substitution - ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like  $NO_2$  and Phenolic). Orientation of (i) Amino, methoxy and methyl groups (ii) Carboxy, nitro, nitrile, carbonyl and sulphonic acid groups (iii) Halogens.

## II. 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 6<sup>th</sup> edition, 1985.

### APPROVED BY



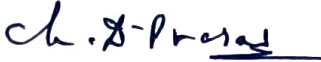
(University Nominee)



(Subject Expert 1)



(Academician)



(Chairman)



(Subject Expert 2)



(Alumni)



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### III -SEMESTER

#### Course Code 5: Organic Qualitative analysis

Credits: 01

Organic Qualitative analysis

#### Course outcomes:

At the end of the course, the student will be able to;

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
2. Determine melting and boiling points of organic compounds
3. Understand the application of concepts of different organic reactions studied in theory part of organic chemistry

#### Syllabus:

Analysis of an organic compound through systematic qualitative procedure for functional group identification including the determination of melting point and boiling point with suitable derivatives. Alcohols, Phenols, Aldehydes, Ketones, Carboxylic acids, Aromatic primary amines, amides and simple sugars.

#### Co-curricular activities and Assessment Methods

1. Continuous Evaluation: Monitoring the progress of student's learning
2. Class Tests, Worksheets and Quizzes
3. Presentations, Projects and Assignments and Group Discussions:  
Enhances critical thinking skills and personality
4. SEMESTER -End Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the SEMESTER .

**Reference books:**

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

**APPROVED BY**



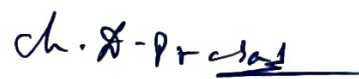
(University Nominee)



(Subject Expert 1)




(Academician)



(Chairman)



(Subject Expert 2)



(Alumni)



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## The blueprint for Semester-End examination question paper for Chemistry

Course Code 5: FUNDAMENTALS IN ORGANIC CHEMISTRY

(23CHE31)

**Part-1:** Answer any five questions choosing atleast two from each section. Each question carries 10 marks. **5x10M=50 marks**

**Part-2 :** Answer any five questions. Each question carries 4 marks. **5x4M=20 marks**

Unit	Part-1		Part-2	Total Marks
	Section-A	Section-B		
Unit I	2	0	2	28
Unit II	2	0	1	24
Unit III	1	1	2	28
Unit IV	0	2	2	28
Unit V	0	2	1	24
				132

## The blueprint for Internal examination question paper for UG Chemistry

4 questions to be answered out of 6 questions

Each question carries 5 marks

MID Examination I

Unit	No.of Questions	No.of Questions to be answered	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit I	2	Any 4 ( 4 X 5 = 20 marks)	5	5	30
Unit II	2				
Unit III	2				

MID Examination II

Unit	No.of Questions	No.of Questions to be answered	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit III	2	Any 4 ( 4 X 5 = 20 marks)	5	5	30
Unit IV	2				
Unit V	2				

APPROVED BY

  
(University Nominee)

  
(Subject Expert 1)

  
(Academician)

  
(Chairman)

  
(Subject Expert 2)

  
(Alumnus)



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### Course Code 5: FUNDAMENTALS IN ORGANIC CHEMISTRY

(23CHE31)

### MODEL QUESTION PAPER

Time :3Hrs

Max.Marks:70

#### PART – 1

Answer any five questions choosing atleast two from each section. Each question carries 10 marks.  
5x10=50 marks

#### Section-A

1. Explain bond polarization and write a note on inductive effect and give its applications ?
2. Explain the types of organic reactions .
3. Write the preparation and properties of alkanes
4. What are cyclo alkanes ? give two methods for the preparation of cyclo alkanes.

Explain their stability on the basis of Baeyer's strain theory

5. Write the preparation and properties of alkenes.

#### Section-B

6. Explain Markownikoff's rule and Anti Markownikoff's rule with suitable examples .

7. Discuss the structure of Benzene.

8. Write the following reaction mechanism of benzene.

a)nitration      b) halogenation

9. Define aromaticity and explain modern theory of aromaticity ( Huckels rule ) for benzenoid and non-benzenoid aromatic compounds .

10. Write a note on orientation effect in benzene ( ortho,meta & para position)

PART – 2

Answer any five questions. Each question carries 4 marks.

5x4=20 marks

11. Explain the types of bond fission with suitable examples.
12. What is hyper conjugation and discuss its applications with suitable examples .
13. Explain sachse mohr predictions.
- 14 Write Diels –Alder reaction .
15. Write a note on conjugated diens.
16. Write a note on concept of resonances and resonances energy of benzene.
17. Write the Freidel crafts Alkylation reaction mechanism of benzene.
18. Write a note on Huckles rule.

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### III -SEMESTER

#### Course Code 6: ORGANIC CHEMISTRY

(Halogen and Oxygen containing organic compounds)

Credits: 03

#### Course outcomes:

At the end of the course, the student will be able to:

1. Understand the concept of  $SN_1$  and  $SN_2$  and  $SN_i$  mechanisms.
2. Describe the reactivity of alcohols and phenols.
3. Achieve the skills required to propose various mechanisms
4. Apply the concepts for synthesising various oxygen containing organic compounds
5. Interconvert the monosaccharides.

#### 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 -  $SN_1$  and  $SN_2$  and  $SN_i$  mechanisms with energy profile diagrams) stereo chemical aspects and effect of solvent) 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:** Preparation of  $1^\circ, 2^\circ, 3^\circ$  alcohols from Grignard's reagent, Bouveault-Blanc Reduction) Chemical properties - substitution of -OH by using  $PCl_5$ ,  $PCl_3$ ,  $PBr_3$ ,  $SOCl_2$  and with  $HX / ZnCl_2$ , Oxidation of alcohols with PCC, PDC; Oxidation of diols by  $HIO_4$  and  $Pb(OAc)_4$ , Pinacol Pinacolone arrangement with mechanism, relative reactivity of  $1^\circ, 2^\circ, 3^\circ$  alcohols.

**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, NaHSO<sub>3</sub> and alcohols. addition-

elimination reactions with hydroxylamine, hydrazine, phenyl hydrazine, 2,4DNP, semicarbazide. Oxidations and reductions (Clemmensen's, Wolf-Kishner's, with LiAlH<sub>4</sub> & NaBH<sub>4</sub>).

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

**Additional Inputs:** Wittig reaction, Baeyer Villiger oxidation.

### 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:** Keto-enol 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,  $\alpha,\beta$ -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; Disaccharides- Haworth structure of maltose, lactose and sucrose.

**Additional Inputs:** Sources of Carbohydrates and Physical properties of Carbohydrates.

## II. List of Reference Books

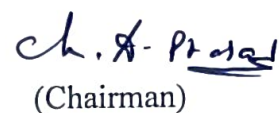
- 1) Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- 2) Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- 3) Guide book to Mechanism in Organic Chemistry by Peter Sykes 6<sup>th</sup> edition,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

  
(University Nominee)

  
(Subject Expert 1)

  
(Academician)

APPROVED BY

  
(Chairman)

  
(Subject Expert 2)

  
(Alumni)

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### III - SEMESTER

#### Course Code 6: Organic preparations

Credits: 01

#### Organic preparation

##### Course outcomes:

On the completion of the course, the student will be able to do the following:

1. How to use glassware, equipment and chemicals and follow experimental procedures in the laboratory.
2. How to calculate limiting reagent, theoretical yield, and percent yield.
3. How to perform common laboratory techniques including reflux, distillation, recrystallization, vacuum filtration.
4. 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.

##### Syllabus - Organic preparations (50M)

- i. Acetylation of  $\beta$ -naphthol, vanillin and salicylic acid by:
  - a) Using conventional method.
  - b) Using green approach
- ii. Preparation of Nerolin

## Co-curricular activities and Assessment Methods;

1. Continuous Evaluation: Monitoring the progress of student's learning
2. Class Tests, Worksheets and Quizzes
3. Presentations, Projects and Assignments and Group Discussions:  
Enhances critical thinking skills and personality
4. SEMESTER -End Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the SEMESTER .

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3. Ahluwalia V. K. and Agarwal R. Comprehensive Practical Organic Chemistry, University press.

  
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(Subject Expert 2)

  
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### The blueprint for Semester-End examination question paper for Chemistry

#### Course Code 6: ORGANIC CHEMISTRY

(Halogen and Oxygen containing organic compounds)

(23CHE32)

**Part-1:** Answer any five questions choosing atleast two from each section. Each question carries 10 marks. **5x10M=50 marks**

**Part-2 :** Answer any five questions. Each question carries 4 marks. **5x4M=20 marks**

Unit	Part-1		Part-2	Total Marks
	Section-A	Section-B		
Unit I	2	0	1	24
Unit II	2	0	2	28
Unit III	1	1	2	28
Unit IV	0	2	2	28
Unit V	0	2	1	24
				132

### The blueprint for Internal examination question paper for UG Chemistry

4 questions to be answered out of 6 questions

Each question carries 5 marks

MID Examination I

Unit	No.of Questions	No.of Questions to be answered	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit I	2	Any 4 ( 4 X 5 = 20 marks)	5	5	30
Unit II	2				
Unit III	2				

MID Examination II

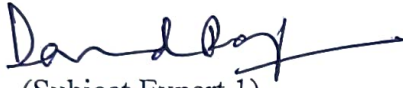
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Unit IV	2				
Unit V	2				



(University Nominee)

APPROVED BY

Ch. S. Prasad  
(Chairman)



(Subject Expert 1)

S. M. A.  
(Subject Expert 2)



(Academician)

A. Abhinav  
(Alumni)



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### Course Code 6: ORGANIC CHEMISTRY

(Halogen and Oxygen containing organic compounds)

(23CHE32)

### MODEL QUESTION PAPER

Time :3Hrs

Max.Marks:70

#### PART – 1

Answer any five questions choosing atleast two from each section. Each question carries 10 marks.  
5x10=50 marks

#### Section-A

1. Write a detail note on  $SN^1$  and  $SN^2$  mechanisms with energy profile diagram.
2. Explain the following
  - a. Sandmeyer's reaction
  - b. Benzyne mechanism
3. How do you prepare  $1^0, 2^0, 3^0$  alcohols from Grignard's reagent and write their reactivity.
4. Explain the following
  - a. Bouveault-Blanc reduction
  - b. Oxidation of alcohols with PCC and PDC
5. Write a note on the following
  - a. Wolf- Kishner's reduction
  - b. Clemensen's reduction

#### Section-B

6. Write the following reactions with mechanisms
  - a. Aldol condensation
  - b. Perkin reaction
7. Explain the following with mechanisms
  - a. Huns-Dieker's reaction
  - b. Arndt-Eistert reaction
8. Write a note on the following
  - a. Hell-Volhard –Zelinsky reaction
  - b. Reformatsky reaction
9. Write a brief note on the following
  - a. Killiani – Fischer synthesis
  - b. Ruff degradation
10. Explain the structural elucidation of Glucose.

**PART – 2**

**Answer any five questions. Each question carries 4 marks.**

**5x4=20 marks**

11. Explain Williamson's synthesis.
12. Write the mechanism of Pinacol-Pinacolone arrangement.
13. Write the mechanism of Kolbe-Schmitt rearrangement.
14. Write a short note on Haloform reaction.
15. Write the mechanism of Cannizzaro reaction.
16. Explain Curtius rearrangement.
17. Write about Keto-Enol tautomerism.
18. What are the epimers and anomers give one example.

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## S.V.K.P & Dr. K.S. RAJU ARTS & SCIENCE COLLEGE (Autonomous)

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PENUGONDA – 534320. W.G.DIST.A.P. INDIA

Phone No: 08819-246126 Email Id:svkp\_penugonda@rediffmail.com Website : svkpandksrajucollege.edu.in

### III - SEMESTER

#### Course Code 7: PHYSICAL CHEMISTRY - I

#### (Solutions & Electro Chemistry)

Credits: 03

#### Course outcomes:

At the end of the SEMESTER the student will be able to

1. Understand the ideal and non ideal behaviour of solutions.
2. Determine the molecular mass of non-volatile solutes.
3. Discuss the basic concepts of Photochemistry.
4. Apply the principles of electrical conductivity.
5. Explain the importance of emf and its applications.

#### Syllabus:

##### Unit I Solutions (9 h)

Classification - Miscible, Partially miscible and Immiscible - Raoult's Law - Azeotropes- HCl-H<sub>2</sub>O system and ethanol-water system. Partially miscible liquids-phenol- water system. Critical solution temperature (CST), Effect of impurity on consolute temperature. Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law.

##### Unit II: Colligative Properties (9 h)

Relative lowering of Vapour Pressure, Elevation in boiling point depression in freezing point and Osmotic pressure. Determination of molecular mass of non-volatile solute by Ostwald-Walker method, Cottrell's method, Rast method and Berkeley-Hartley method. Abnormal colligative properties. Van't Hoff factor.

**Additional Inputs:** Definition of colligative properties and non – colligative properties. Relation between Elevation in Boiling point and Relative lowering of vapour pressure

### Unit III – Photochemistry ( 9h )

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 and hydrogen- bromine reaction. Qualitative description of fluorescence, phosphorescence, Jablonski diagram, chemiluminescence - Photosensitized reactions- energy transfer processes (simple example), quenching, Photo stationary state.

### Unit IV Electrochemistry-I ( 9 h )

Conductance, Specific conductance, equivalent conductance and molar conductance - effect of dilution. Cell constant. Strong and weak electrolytes, Kohlrausch's law and its applications, Definition of transport number, determination of transport number by Hittorf's method. Debye-Huckel - Onsagar's equation for strong electrolytes (derivation excluded), Application of conductivity measurements- conductometric titrations.

**Additional Inputs:** Relation between Equivalent and Molar conductance . Arrhenius theory of electrolytic dissociation.

### Unit V Electrochemistry-II ( 9 h )

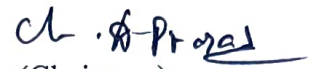
Electrochemical Cells- Single electrode potential, Types of electrodes with examples: Metal-metal ion, Gas electrode, Inert electrode, Redox electrode, Metal-metal insoluble salt- salt anion. Determination of EMF of a cell, Nernst equation, Applications of EMF measurements -Potentiometric titrations. Fuelcells – Basic concepts, examples and applications.

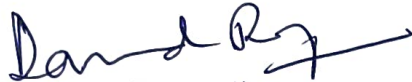
#### List of Reference books:

- 1) Principles of physical chemistry by Prutton and Marron
- 2) Solid State Chemistry and its applications by Anthony R. West
- 3) Text book of physical chemistry by K L Kapoor
- 4) Text book of physical chemistry by S Glasstone
- 5) Advanced physical chemistry by Bahl and Tuli
- 6) Advanced physical chemistry by Gurudeep Raj

  
(University Nominee)

APPROVED BY

  
(Chairman)

  
(Subject Expert 1)

  
(Subject Expert 2)

  
(Academician)

  
(Alumni)



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### III - SEMESTER

#### Course Code 7: PHYSICAL CHEMISTRY -I

Credits: 01

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#### PHYSICAL CHEMISTRY

##### I. Course outcomes:

At the end of the course, the student will be able to:

1. Use of glassware, equipment and chemicals and follow experimental procedures in the laboratory.
2. Understand and apply the concepts of solutions practically.
3. Apply concepts of electrochemistry in experiments.

##### II. Syllabus:

#### CST, Conductometric and Potentiometric Titrimetry

50 M

1. Determination of CST for Phenol-water system.
2. Effect of electrolyte on CST.
3. Conductometric titration - Determination of concentration of HCl solution using standard NaOH solution.
4. Conductometric titration – Determination of concentration of CH<sub>3</sub>COOH Solution using standard NaOH solution.
5. Potentiometric titration-Determination of concentration of HCl using standard NaOH solution.

### III. Co-curricular activities and Assessment Methods;

- 1) Continuous Evaluation: Monitoring the progress of student's learning
  - 2) Class Tests, Worksheets and Quizzes
  - 3) Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality
- SEMESTER -End Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the SEMESTER .

### IV. List of reference books:

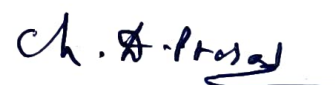
- 1) A Text Book of Quantitative Inorganic Analysis(3<sup>rd</sup>Edition) –A.I.Vogel
- 2) Web related references suggested by teacher.

  
(University Nominee)

  
(Subject Expert 1)

  
(Academician)

APPROVED BY

  
(Chairman)

  
(Subject Expert 2)

  
(Alumnus)



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### The blueprint for Semester-End examination question paper for Chemistry

#### Course Code 7: PHYSICAL CHEMISTRY - I

**Part-1:** Answer any five questions choosing atleast two from each section. Each question carries 10 marks. **5x10M=50 marks**

**Part-2 :** Answer any five questions. Each question carries 4 marks.

**5x4M=20 marks**

Unit	Part-1		Part-2	Total Marks
	Section-A	Section-B		
Unit I	2	0	2	28
Unit II	2	0	2	28
Unit III	1	1	1	24
Unit IV	0	2	1	24
Unit V	0	2	2	28
				132

### The blueprint for Internal examination question paper for UG Chemistry

4 questions to be answered out of 6 questions

Each question carries 5 marks

MID Examination I

Unit	No. of Questions	No. of Questions to be answered	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit I	2	Any 4 (4 X 5 = 20 marks)	5	5	30
Unit II	2				
Unit III	2				

MID Examination II

Unit	No. of Questions	No. of Questions to be answered	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit III	2	Any 4 (4 X 5 = 20 marks)	5	5	30
Unit IV	2				
Unit V	2				

APPROVED BY

(University Nominee)

(Subject Expert 1)

(Academician)

(Chairman)

(Subject Expert 2)

(Alumni)



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Course Code 7: PHYSICAL CHEMISTRY - I

### MODEL QUESTION PAPER

(23CHE33)

Time :3Hrs

Max.Marks:70

#### PART – 1

Answer any five questions choosing atleast two from each section. Each question carries 10 marks.  
5x10=50 marks

#### Section-A

- 1 .What is Critical solution temperature and write effect of impurity on CST?
2. Define Nernst distribution law and write applications of distribution law?
3. Explain Relative lowering of vapour pressure and Osmotic pressure?
4. Write the determination of molecular mass of non- volatile solute by Ostwald-Walker method.
5. Explain photochemical reaction mechanism by Hydrogen-Chlorine reaction.

#### Section-B

6. Explain Jablonski diagram.
7. Write the Kohlrausch's law and its applications?
8. Define transport number and determination of transport number by Hittorf's method.
9. Write a note on types of electrodes with examples.
10. Explain the determination of EMF of a cell.

**PART – 2**

**Answer any five questions. Each question carries 4 marks.**

**5x4=20 marks**

11. Write the process of Steam distillation.
12. Write the calculation of partition coefficient.
13. Write a brief note on Barkeley-Hartley method.
14. Define and explain Van't Hoff factor.
15. Write a brief note on Stark-Einstein's law of photochemical equivalence.
16. Deduce Debye-Huckel-Onsagar's equation for strong electrolytes.
17. Write a short note on Nernst equation.
18. Determine the EMF of a cell and its applications.

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### III –SEMESTER

#### COURSE CODE 8: INORGANIC AND PHYSICAL CHEMISTRY

Credits: 03

#### I. Course outcomes:

At the end of the SEMESTER the student will be able to:

- 1) Apply IUPAC nomenclature for Coordination compounds
- 2) Understand the various theories, structure and stereo chemistry of coordination compounds.
- 3) Explain the reaction mechanism in complexes.
- 4) Apply the 18 electron rule.
- 5) Discuss the basic concepts of thermodynamics.

#### II. Syllabus;

##### Unit I Coordination Chemistry-I ( 9 h )

IUPAC nomenclature of Coordination compounds, structural and stereo isomerism in complexes with coordination numbers 4 and 6. Valence Bond Theory(VBT):Postulates-magnetic properties- Inner and outer orbital complexes. Limitations of VBT, CFT- Postulates

- Splitting in Octahedral, tetrahedral, tetragonal and square planar fields. Crystal field stabilization energy(CFSE), Crystal field effects for weak and strong fields. Factors affecting the magnitude of crystal field splitting energy, Spectro chemical series, Tetragonal distortion of octahedral geometry, Jahn-Teller distortion.

##### UNIT–II Coordination Chemistry II ( 9 h )

#### 1. Inorganic molecular Reaction Mechanism: ( 6 h )

Introduction to inorganic reaction mechanisms. Concept of reaction pathways, transition state, intermediate and activated complex. Labile and inert complexes, ligand substitution reactions –  $SN_1$  and  $SN_2$ , Substitution reactions in square planar complexes, Trans-effect, theories of trans effect and its applications

## 2. Stability of metal complexes: ( 3 h )

Thermodynamic stability and kinetic stability, factors affecting the stability of metal complexes, chelate effect, determination of composition of complex by Job's method and mole ratio method.

### Unit III Organo metallic compounds ( 9 h )

Definition and classification of organo metallic Compounds on the basis of bond type, Metalcarbonyls: 18 electron rule, electron count of mononuclear, poly nuclear and substituted metal carbonyls of 3d series. General methods of preparation of mono and binuclear carbonyls of 3d series.  $\pi$ -acceptor behaviour of CO (MO diagram of CO to be discussed), synergic effect and use of IR data to explain extent of back bonding.

**Additional Inputs:** Physical properties of Organo metallic compounds , Lanthanide and Actinide Organo metallic compounds.

### Unit IV Thermodynamics- I ( 9 h )

Concept of heat(q), work(w), internal energy(U), State function and Path function- statement of first law; enthalpy(H), relation between heat capacities, calculations of q, w, U and H for reversible, irreversible processes, Joule-Thomson effect- coefficient, Calculation of work for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes. Temperature dependence of enthalpy of formation- Kirchoff's equation.

**Additional Inputs:** Thermodynamic processes , Reversible and irreversible processes.

### Unit V Thermodynamics II ( 9 h )

Second law of thermodynamics Different Statements of the law, Carnot cycle and its efficiency, Carnot theorem, Concept of entropy, entropy as a state function, entropy changes in reversible and irreversible processes. Entropy changes in spontaneous and equilibrium processes. Third law of thermodynamics, Nernst heat theorem, Spontaneous and non-spontaneous processes, Helmholtz and Gibbs equation - Criteria for spontaneity.


### III. List of Reference Books:

- 1) Concise coordination chemistry by Gopalan and Ramalingam
- 2) Coordination Chemistry by Basalo and Johnson
- 3) Text book of physical chemistry by S Glasstone

- 4) Concise Inorganic Chemistry by J.D.Lee
- 5) Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
- 6) A Text Book of Physical Chemistry by K.L.Kapoor Vol 2, 6<sup>th</sup> edition, 2019.

  
(University Nominee)

APPROVED BY

  
(Chairman)

  
(Subject Expert 1)

  
(Subject Expert 2)

  
(Academia)

  
(Alumni)



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### III- SEMESTER

#### COURSE CODE 8: QUALITATIVE INORGANIC ANALYSIS

Credits: 01

#### Qualitative inorganic analysis

( Minimum of Six mixtures should be analyzed)

#### Course outcomes:

At the end of the course, the student will be able to:

- 1) Understand the basic concepts of qualitative analysis of inorganic mixture.
- 2) Use glassware, equipment and chemicals and follow experimental procedures in the laboratory.
- 3) Apply the concepts of common ion effect, solubility product and concepts related to qualitative analysis.

#### Analysis of Mixture

50M

Analysis of mixture salt containing two anions and two cations (From two different groups) from the following:

**Anions:** Carbonate, Sulphate, Chloride, Bromide, Acetate, Nitrate, Borate, Phosphate.

**Cations:** Lead, Copper, Iron, Aluminium, Zinc, Nickel, Manganese, Calcium, Strontium, Barium, magnesium and Ammonium.

Minimum of Six mixtures should be analyzed.

#### Co-curricular activities and Assessment Methods

- 1) Continuous Evaluation: Monitoring the progress of student's learning
- 2) Class Tests, Worksheets and Quizzes

- 3) Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality
- 4) SEMESTER - End Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the SEMESTER .

**List of Text books:**

1. A textbook of qualitative inorganic analysis by A.I. Vogel.

  
(University Nominee)

APPROVED BY

  
(Chairman)

  
(Subject Expert 1)

  
(Subject Expert 2)

  
(Academicia)

  
(Alumni)



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## The blueprint for Semester-End examination question paper for Chemistry

### COURSE CODE 8: INORGANIC AND PHYSICAL CHEMISTRY (23CHE34)

Part-1: Answer any five questions choosing atleast two from each section. Each question carries

10 marks.

5x10M=50 marks

Part-2 : Answer any five questions. Each question carries 4 marks.

5x4M=20 marks

Unit	Part-1		Part-2	Total Marks
	Section-A	Section-B		
Unit I	2	0	2	28
Unit II	2	0	2	28
Unit III	1	1	1	24
Unit IV	0	2	2	28
Unit V	0	2	1	24
				132

### The blueprint for Internal examination question paper for UG Chemistry

4 questions to be answered out of 6 questions

Each question carries 5 marks

#### MID Examination I

Unit	No. of Questions	No. of Questions to be answered	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit I	2	Any 4 ( 4 X 5 = 20 marks)	5	5	30
Unit II	2				
Unit III	2				

#### MID Examination II

Unit	No. of Questions	No. of Questions to be answered	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit III	2	Any 4 ( 4 X 5 = 20 marks)	5	5	30
Unit IV	2				
Unit V	2				

APPROVED BY

(University Nominee)

(Subject Expert 1)

(Academician)

(Chairman)

(Subject Expert 2)

(Alumni)



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### COURSE CODE 8: INORGANIC AND PHYSICAL CHEMISTRY

#### MODEL QUESTION PAPER

(23CHE34)

TIME :3HRS

Max.Marks:70

#### PART – 1

Answer any five questions choosing atleast two from each section. Each question carries 10 marks.  
5x10=50 marks

#### Section-A

1. Explain Valence bond theory with inner and outer Orbital Complexes. Write limitations of VBT?
2. Explain the Crystal field splitting in Octahedral, Tetrahedral and Square Planar Complexes?
3. Explain Trans effect. Explain the theories of Trans effect and write any two applications of Trans effect?
4. Explain the factors affecting the stabilities of metal complexes?
5. What are Organo metallic compounds. Discuss their classification on the basis of type of bond with complexes?

#### Section-B

6. Discuss the general methods of preparations of mono & bi nuclear carbonyls of 3d series?
7. Explain briefly about Kirchoff equation?
8. Calculation of Work for the expansion of perfect gas under Isothermal and Adiabatic conditions for reversible processes?
9. Explain briefly about Carnot's theorem?
10. Define Entropy. Describe Entropy changes in the Reversible and Irreversible Process?

## PART – 2

Answer any five questions. Each question carries 4 marks.

5x4=20 marks

11. Write a note on Jahn-Teller Distortion?
12. Explain the Geometrical Isomerism in Octahedral complexes?
13. Explain Labile and Inert Complexes?
14. Explain Job's method for determination of composition of complex?
15. Describe the 18 electron rule of mono nuclear and Poly nuclear metal carbonyls with suitable examples?
16. Define Heat Capacities and Derive  $C_p - C_v = R$ ?
17. Write a short note on Joule- Thomson's effect?
18. Write a short note on Nernst Heat theorem?

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### IV - SEMESTER

#### COURSE CODE 9: PHYSICAL CHEMISTRY -II

(States of Matter, Phase Rule & Surface Chemistry)

Credits: 03

#### I. Course outcomes:

At the end of the SEMESTER the student will be able to:

1. Explain the difference between solids liquids and gases in terms of intermolecular interactions.
2. Differentiate ideal and real gases.
3. Discuss the basic concepts of two component systems
4. Apply the concepts of adsorption.
5. Understand the basic concepts of crystallography.

#### II. Syllabus:

##### Unit I - Gaseous state (9 h )

Postulates of Kinetic theory of Gases (exclude derivation) – deduction of gas laws from kinetic gas equation-Vander Waal's equation of state. Andrew's isotherms of carbon dioxide, continuity of state. Critical phenomena. Relationship between critical constants and vander Waal's constants. Law of corresponding states. Joule- Thomson effect. Inversion temperature.

##### Unit II – Liquid State (9 h )

Physical properties of liquids; vapour pressure, surface tension and coefficient of viscosity, and their determination. Effect of addition of various solutes on surface tension and viscosity. Temperature variation of viscosity of liquids and comparison with that of gases. Qualitative discussion of structure of water.

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-III - Solid state ( 9h )**

Symmetry in crystals. Law of constancy of interfacial angles. The law of rationality of indices. Miller indices, 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. Powder method. Defects in crystals. Stoichiometric and non-stoichiometric defects.

### **Unit IV - Phase Rule ( 9 h )**

The Concept of phase, components, degrees of freedom. Gibbs phase rule. Phase diagram of one component system – water system, Study of Phase diagrams of Simple eutectic systems

i) Pb-Ag system, desilverisation of lead ii) NaCl-Water system, Congruent and incongruent melting point- Definition and examples for systems having congruent and incongruent melting point, freezing mixtures

### **Unit V Surface Chemistry ( 9 h )**

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.

#### Additional Inputs :

Solids in liquids(sols), Liquids in liquids (emulsions) , Liquids in solids (gels)

### III. List of Reference Books:

- 1) Solid State Chemistry and its applications by Anthony R. West
- 2) Text book of physical chemistry by K L Kapoor Vol.1
- 3) Text book of physical chemistry by S Glasstone
- 4) Advanced physical chemistry by Bahl and Tuli.

### APPROVED BY



(University Nominee)



(Subject Expert 1)



(Academician)



(Chairman)



(Subject Expert 2)



(Alumni)



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### IV - SEMESTER

#### Course Code 9: Organic Preparations

Credits: 01

#### Course outcomes:

At the end of the course, the student will be able to:

- 1) Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
- 2) Apply concepts of surface chemistry in experiments.
- 3) Be familiar with the concepts & practical applications of Surface tension and viscosity of liquids.

#### Physical Chemistry Practical Syllabus:

1. Determination of surface tension of liquid by drop count method
2. Determination of surface tension of liquid by drop weight method
3. Determination of surface tension of mixture (liquid + detergent) using stalagmometer.
4. Determination of coefficient of viscosity of an organic liquid.
5. Determination of composition of a glycerol in glycerol + water mixture using viscometer.
6. Adsorption of acetic acid on animal charcoal, verification of Freundlich isotherm.

#### Co-curricular activities and Assessment Methods:

- 1) Continuous Evaluation: Monitoring the progress of student's learning
- 2) Class Tests, Worksheets and Quizzes
- 3) Presentations, Projects and Assignments and Group Discussions: Enhances


critical thinking skills and personality

- 4) SEMESTER -End Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the SEMESTER .

**List of reference books:**

- 1) A Text Book of Quantitative Inorganic Analysis(3<sup>rd</sup>Edition) –A.I.Vogel
- 2) Web related references suggested by teacher.

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& ISO Certified Institution (with 3 ISO Certificates)

(Affiliated to ADIKAVI NANNAYA UNIVERSITY - Recognized by Govt. of Andhra Pradesh)

PENUGONDA – 534320. W.G.DIST.A.P. INDIA

Phone No: 08819-246126 Email Id:svkp\_penugonda@rediffmail.com Website : svkpandksrajucollege.edu.in

### The blueprint for Semester-End examination question paper for Chemistry

#### COURSE CODE 9: PHYSICAL CHEMISTRY -II

**Part-1:** Answer any five questions choosing atleast two from each section. Each question carries

10 marks.

**5x10M=50 marks**

**Part-2 :** Answer any five questions. Each question carries 4 marks.

**5x4M=20 marks**

Unit	Part-1		Part-2	Total Marks
	Section-A	Section-B		
Unit I	2	0	2	28
Unit II	2	0	2	28
Unit III	1	1	2	28
Unit IV	0	2	1	24
Unit V	0	2	1	24
				132

### The blueprint for Internal examination question paper for UG Chemistry

4 questions to be answered out of 6 questions

Each question carries 5 marks

MID Examination I

Unit	No. of Questions	No. of Questions to be answered	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit I	2	Any 4 ( 4 X 5 = 20 marks)	5	5	30
Unit II	2				
Unit III	2				

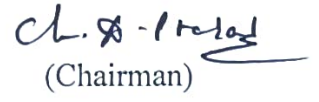
MID Examination II

Unit	No. of Questions	No. of Questions to be answered	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit III	2	Any 4 ( 4 X 5 = 20 marks)	5	5	30
Unit IV	2				
Unit V	2				



(University Nominee)

APPROVED BY



(Chairman)



(Subject Expert 1)



(Subject Expert 2)



(Academician)



(Alumni)



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### COURSE CODE 9: PHYSICAL CHEMISTRY -II

### MODEL QUESTION PAPER

(23CHE41)

TIME :3HRS

Max.Marks:70

#### PART – 1

Answer any five questions choosing atleast two from each section. Each question carries 10 marks.  
5x10=50 marks

#### Section-A

1. Give the relationship between vanderwaall constant and critical constants.
2. Explain Joule thomson experiment and joule thomson effect.
3. Explain about physical properties of liquids.
4. Define and classify the liquid crystals.
5. Derive the Bragg's equation.

#### Section-B

6. Explain about crystal defects
7. Define phase rule and terms involved in it. Explain phase diagram of Pb-Ag system.
8. Explain phase diagram of one component system water system
9. Define a) coagulation of colloids b) Gold number c )Hardyz -schulze law.
10. Explain about Langmuir adsorption isotherms.

**PART – 2**

**Answer any five questions. Each question carries 4 marks.**

**5x4=20 marks**

11. Explain the isotherms of CO<sub>2</sub>.
12. Derive the reduced equation of States and write the law of corresponding states.
13. Write the applications of liquid crystals.
14. Write the effect of addition of various solutes on surface tension.
15. Explain about law of consistency of interfacial angles and law of rotational indices.
16. Write about symmetry in crystals.
17. Explain thermodynamic derivations of Gibb's phase rule.
18. Write the difference between physical and chemical adsorption.

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### IV - SEMESTER

#### Course Code 10: GENERAL AND PHYSICAL CHEMISTRY

Credits: 03

#### I. Course outcomes:

At the end of the SEMESTER the student will be able to:

1. Correlate and describe the stereochemical properties of organic compounds.
2. Explain the biological significance of various elements present in the human body.
3. Apply the concepts of ionic equilibrium for the qualitative and quantitative analysis.
4. Determine the order of a chemical reaction.
5. Describe the basic concepts of enzyme catalysis.

#### II. Syllabus:

##### UNIT-I Stereo chemistry of carbon compounds ( 9 h )

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

Optical isomerism: Optical activity- wave nature of light, plane polarised light, optical rotation and specific rotation. Chiral molecules- definition and criteria (Symmetry elements)- Definition of enantiomers and diastereomers – Explanation of optical isomerism with examples- Glyceraldehyde, Lactic acid, Alanine, Tartaric acid, 2,3-dibromopentane.

##### Unit II Bioinorganic Chemistry ( 9 h )

✓Metal ions present in biological systems, classification of elements according to their action in biological system. Geochemical effect on the distribution of metals, Na / K- pump, carbonic anhydrase and carboxy peptidase. Excess and deficiency of some trace metals. Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity, Use of chelating agents in medicine, Cisplatin as an anti-cancer drug. Iron and its application in bio-systems, Haemoglobin-transfer of oxygen, Myoglobin-Storage and transfer of iron

### **Unit III Ionic equilibrium ( 9 h )**

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, Buffer solutions-Henderson's equation. Indicators-theories of acid – base Indicators, selection of Indicators,

Common ion effect Solubility and solubility product of sparingly soluble salts – applications of solubility product principle.

**Additional Inputs:** Introduction of Ionic equilibrium, Differences between Electrolytes and non – electrolytes.

### **Unit IV Chemical Kinetics-I: ( 9 h )**

The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction, Derivation of integrated rate equations for zero, first and second order reactions (similar and different reactants). Half-life of a reaction. General methods for determination of order of a reaction.

**Additional Inputs:** Methods of determination of order of reactions , temperature dependence of rate of reactions.

### **Unit V Chemical Kinetics-II: ( 9 h 0**

Concept of activation energy and its calculation from Arrhenius equation. Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).

Enzyme catalysis- Specificity, factors affecting enzyme catalysis, Inhibitors and Lock & key model. Michaels- Menten equation- derivation, significance of Michaelis-Menten constant.

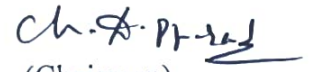
### **III. Reference books**

- 1) Text book of physical chemistry by S Glasstone
- 2) Concise Inorganic Chemistry by J.D.Lee
- 3) Advanced physical chemistry by Gurudeep Raj
- 4) Advanced physical chemistry by Bahl and Tuli
- 5) Inorganic Chemistry by J.E.Huheey
- 6) Basic Inorganic Chemistry by Cotton and Wilkinson.



(University Nominee)

APPROVED BY



(Chairman)



(Subject Expert 1)



(Subject Expert 2)



(Academician)



(Alumni)



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### IV - SEMESTER

#### Course Code 10: Physical Chemistry - Volumetric Analysis

Credits: 01

#### Physical Chemistry - Volumetric Analysis

##### IV. Course outcomes:

At the end of the course, the student will be able to;

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
2. Understand and explain the volumetric analysis based on fundamental concepts learnt in ionic equilibria
3. Learn and identify the concepts of a standard solutions, primary and secondary standards
4. Facilitate the learner to make solutions of various molar concentrations.

##### V. Syllabus:

###### Volumetric analysis:

1. Estimation of sodium hydroxide using standardised HCl solution.
2. Estimation of sodium carbonate and sodium hydroxide present in a mixture.
3. Determination of Fe (II) using  $\text{KMnO}_4$  with oxalic acid as primary standard. (internal indicator method)
4. Determination of Fe (II) using  $\text{KmnO}_4$  with oxalic acid as primary standard. (external indicator method)
5. Estimation of water of crystallization in Mohr's salt by titrating with  $\text{KmnO}_4$

##### VI. Co-curricular activities and assessment methods :


1. Continuous Evaluation: Monitoring the progress of student's learning
2. Class Tests, Worksheets and Quizzes

3. Presentations, Projects and Assignments and Group Discussions:  
Enhances critical thinking skills and personality
  
4. SEMESTER -End Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the SEMESTER .


**VII. List of reference books:**

1. A Text Book of Quantitative Inorganic Analysis(3<sup>rd</sup>Edition) –A.I.Vogel

Web related references suggested by teacher

  
(University Nominee)


APPROVED BY

  
(Chairman)

  
(Subject Expert 1)

  
(Subject Expert 2)

  
(Academician)

  
(Alumni)



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### The blueprint for Semester-End examination question paper for Chemistry

#### Course Code 10: Physical Chemistry - Volumetric Analysis (23CHE42)

**Part-1:** Answer any five questions choosing atleast two from each section. Each question carries 10 marks. **5x10M=50 marks**

**Part-2 :** Answer any five questions. Each question carries 4 marks. **5x4M=20 marks**

Unit	Part-1		Part-2	Total Marks
	Section-A	Section-B		
Unit I	2	0	2	28
Unit II	2	0	2	28
Unit III	1	1	1	24
Unit IV	0	2	2	28
Unit V	0	2	1	24
				132

#### **The blueprint for Internal examination question paper for UG Chemistry**

4 questions to be answered out of 6 questions

Each question carries 5 marks

MID Examination I

Unit	No.of Questions	No.of Questions to be answered	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit I	2	Any 4 ( 4 X 5 = 20 marks)	5	5	30
Unit II	2				
Unit III	2				

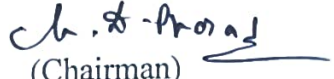
MID Examination II

Unit	No.of Questions	No.of Questions to be answered	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit III	2	Any 4 ( 4 X 5 = 20 marks)	5	5	30
Unit IV	2				
Unit V	2				



(University Nominee)

APPROVED BY



(Chairman)



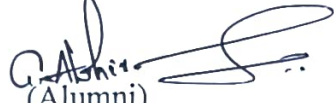
(Subject Expert 1)



(Subject Expert 2)



(Academician)



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**Course Code 10: GENERAL AND PHYSICAL CHEMISTRY**

**MODEL QUESTION PAPER(23CHE42)**

**Time: 3Hrs**

**Max. Marks: 70**

**PART – 1**

**Answer any five questions choosing at least two from each section. Each question carries 10 marks.  
5x10=50 marks**

**Section-A**

1. Explanation of Optical isomerism with Glyceraldehyde, Lactic acid, Alanine, Tartaric acid and 2,3-dibromo pentane?
2. Draw the Wedge, Fischer, Newman & Saw-Horse representation for Tartaric acid?
3. Explain the biological functions of Haemoglobin and Myoglobin?
4. Explain briefly about classification of elements according to their action in biological system?
5. Explain the Theories of Acid-Base Indicators?

**Section-B**

6. Explain briefly about Buffer solutions-Henderson's equation?
7. Define and Derive the First Order reaction?
8. What is Rate of reaction? Explain the factors affecting Rate of reaction?
9. Explain the Collision theory and Activated complex theory of biomolecular reactions?
10. Derive and Signification of Michaels-Menten equation?

## PART – 2

Answer any five questions. Each question carries 4 marks.

5x4=20 marks

11. Define Enantiomers and Diastereomers and give two examples for each ?
12. Write a short note on Optical activity?
13. Write a note on the use of Chelating agents in Medicines?
14. Write a short note on Toxicity of metal ions (Hg, Pb, Cd, As)?
15. Write a short note on Common ion effect?
16. Define Order and Molecularity?
17. Define and write the Half –Life of a Zero order reaction?
18. What is Enzyme catalysis? Write any three factors affecting Enzyme catalysis?.

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### IV - SEMESTER

#### Course Code 11: Nitrogen containing Organic Compounds & Spectroscopy

Credits: 03

#### Nitrogen containing Organic Compounds & Spectroscopy

##### I. Course outcomes:

At the end of the SEMESTER the student will be able to:

1. Distinguish primary secondary and tertiary amines and their properties.
2. Describe the preparation and properties of amino acids.
3. Explain the reactivity of nitro hydrocarbons.
4. Discuss heterocyclic compounds with N, O and S.
5. Apply the concepts of UV and IR to ascertain the functional group in an organic compound.

##### II. Syllabus:

##### UNIT- I: Amines ( 9 h )

Classification, chirality in amines (pyramidal inversion), preparations – Gabriel synthesis, Hoffmann- Bromamide reaction ( with mechanism), reduction of amides and Schmidt reaction. Distinction between Primary, secondary and tertiary amines using Hinsberg's method and nitrous acid. Discussion of the following reactions with emphasis on the mechanistic pathway: Carbylamine reaction, Hoffmann's exhaustive methylation, Hofmann and Cope elimination.

**Diazonium Salts:** Preparation and synthetic applications of diazonium salts including preparation of arenes, haloarenes, phenols, cyano and nitro compounds. Coupling reactions of diazonium salts (preparation of azo dyes).

##### UNIT- II Amino acids ( 9 h )

Definition and classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids - definition and examples, classification of alpha amino

acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: a) from halogenated carboxylic acid, b) Gabriel Phthalimide synthesis c) Strecker's synthesis.

**Physical properties:** Zwitter ion structure - salt like character - solubility, melting points, amphoteric character, definition of isoelectric point. **Chemical properties:** General reactions due to amino and carboxyl groups - lactams from gamma and delta amino acids by heating-peptide bond (amide linkage). Structure and nomenclature of peptides and proteins.

#### ✓ **UNIT- III Nitro hydrocarbons ( 9h )**

Nomenclature and classification, structure -Tautomerism of nitroalkanes leading to acid and keto form, Preparation of Nitroalkanes, reactivity - halogenation, reaction with HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Micheal addition and reduction.

#### ✓ **Unit IV Heterocyclic Compounds ( 9 h )**

✓ Introduction and definition: Simple five membered ring compounds with one hetero atom Ex. Furan, Thiophene and Pyrrole - Aromatic character – Preparation from 1, 4, -dicarbonyl compounds, Paul-Knorr synthesis. Properties: Acidic character of pyrrole - electrophillic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation - Diels Alder reaction in furan. Pyridine – synthesis - Aromaticity -Basicity - Comparison with pyrrole- one method of preparation and properties - Reactivity towards Nucleophilic substitution reaction.

**Additional Inputs:** Classification of Heterocyclic compounds.

#### ✓ **Unit V: UV-Visible & IR Spectroscopy ( 9 h )**

Selection rules for electronic spectra, types of electronic transitions in molecules, concept of chromophore and Auxochrome, effect of conjugation- Woodward Fischer rules for calculating  $\lambda_{\max}$  of conjugated dienes and  $\alpha,\beta$  unsaturated compounds. Infrared spectroscopy and types of molecular vibrations and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and intra molecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on  $>C=O$  stretching absorptions).

**Additional Inputs:** Applications of UV- Visible and IR Spectroscopy, Beer's law and Lambert's law.

- 1) A Text Book of Organic Chemistry by Bahl and Arunbahl
- 2) A Text Book of Organic chemistry by I L Finar Vol I
- 3) Organic chemistry by Bruice
- 4) Organic chemistry by Clayden
- 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) Spectrometric Identification of Organic Compounds by Robert M Silverstein, Francis X Webster



(University Nominee)



(Subject Expert 1)



(Academician)

APPROVED BY



(Chairman)



(Subject Expert 2)



(Alumni)



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### IV - SEMESTER

#### Course Code 11: Organic preparations and IR Spectral Analysis

Credits: 01

#### Organic preparations and IR Spectral Analysis

##### Course outcomes:

On completion of the course, the student will be able to:

- 11) Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
- 12) Calculate limiting reagent, theoretical yield, and percent yield
- 13) Engage in safe laboratory practices by handling laboratory glassware, equipment, and chemical reagents appropriately
- 14) Dispose of chemicals in a safe and responsible manner
- 15) Perform common laboratory techniques including reflux, distillation, recrystallization, vacuum filtration.
- 16) Create and carry out work up and separation procedures.

##### Syllabus:

##### A. Organic preparations: 40M

- 1) Acetylation of one of the following compounds: amines (aniline, o-, m-, ptoluidines and o-, m-, p-anisidine)
  - a. Using conventional method.
  - b. Using green approach
- 2) Benzoylation of one of the following amines (aniline, o-, m-, p- toluidines and o-, m-, p-anisidine)
- 3) Nitration of any one of the following:  
Acetanilide/nitrobenzene by conventional method

## B.IR Spectral Analysis 10M

IR Spectral Analysis of the following functional groups with examples a) Hydroxyl groups b) Carbonyl groups c) Amino groups d) Aromatic groups

### Co-curricular activities and assessment methods:

1. Continuous Evaluation: Monitoring the progress of student's learning
2. Class Tests, Worksheets and Quizzes
3. Presentations, Projects and Assignments and Group Discussions:  
Enhances critical thinking skills and personality
4. SEMESTER -End Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the SEMESTER .

### List of reference books:

1. Vogel A.I .Practical Organic Chemistry, Longman Group Ltd.
2. Bansal R.K. Laboratory Manual of Organic Chemistry, Wiley-Eastern.
3. Ahluwalia V. K. and Agarwal R. Comprehensive Practical Organic Chemistry, University press.
4. Web related references suggested by teacher.

  
(University Nominee)

  
(Subject Expert 1)

  
(Academician)

APPROVED BY

  
(Chairman)

  
(Subject Expert 2)

  
(Alumni)



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### The blueprint for Semester-End examination question paper for Chemistry

Course Code 11: Organic preparations and IR Spectral Analysis

(23CHE43)

**Part-1:** Answer any five questions choosing atleast two from each section. Each question carries 10 marks. **5x10M=50 marks**

**Part-2 :** Answer any five questions. Each question carries 4 marks. **5x4M=20 marks**

Unit	Part-1		Part-2	Total Marks
	Section-A	Section-B		
Unit I	2	0	1	24
Unit II	2	0	2	28
Unit III	1	1	1	24
Unit IV	0	2	2	28
Unit V	0	2	2	28
				132

### The blueprint for Internal examination question paper for UG Chemistry

4 questions to be answered out of 6 questions

Each question carries 5 marks

MID Examination I

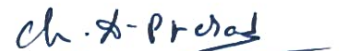
Unit	No.of Questions	No.of Questions to be answered	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit I	2	Any 4 (4 X 5 = 20 marks)	5	5	30
Unit II	2				
Unit III	2				

MID Examination II

Unit	No.of Questions	No.of Questions to be answered	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit III	2	Any 4 (4 X 5 = 20 marks)	5	5	30
Unit IV	2				
Unit V	2				

  
(University Nominee)

APPROVED BY

  
(Chairman)

  
(Subject Expert 1)

  
(Subject Expert 2)

  
(Academician)

  
(Alumni)



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**Course Code11: Nitrogen Containing Organic Compounds & Spectroscopy**

**MODEL QUESTION PAPER**

**Time: 3Hrs**

**Max. Marks: 70**

**PART – 1**

**Answer any five questions choosing at least two from each section. Each question carries 10 marks.**

**5x10=50 marks**

**Section-A**

1. Write the following reactions with mechanisms

- a. Hoffmann-Bromamide reaction      b. Hoffmann-Cope elimination.

2. How do you distinguish the 1<sup>o</sup>, 2<sup>o</sup>, 3<sup>o</sup> amines using Hinsberg's method.

3. Define amino acids and write the classification of amino acids.

4. Write the synthesis of amino acids from Gabriel Phthalimide synthesis and Strecker's synthesis

5. Explain the following reactions.

- a. Nef reaction.      b. Mannich reaction.

**Section-B**

6. Write the preparations of Nitroalkanes and their reactivity.

7. a. Define Heterocyclic compounds and Write Paul-Knorr synthesis.

b. Explain Acidic character of Pyrrole.

8. a. Write a detail note on Diels Alder reaction Furan.

b. Write the aromaticity of Pyridine.

9. Explain types of electronic transitions in Uv- Spectroscopy.

10. Write a detail note on Molecular vibrations.

**PART – 2**

**Answer any five questions. Each question carries 4 marks.**

**5x4=20 marks**

11. Write a note on coupling reaction of Diazonium salts.

12. Define Iso electric point and Zwitter ion.

13. Write the nomenclature and structure of peptides and proteins.

14. Write a short note on classification of Nitro hydro carbons.

15. Write the synthesis of pyridine.
16. Explain Nucleophilic substitution reactions of Pyrrole.
17. Explain Chromophore and Auxochrome with examples.
18. Write a short note on Finger print region.

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