

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

Recognized by UGC as "College with Potential for Excellence (2016-21)"

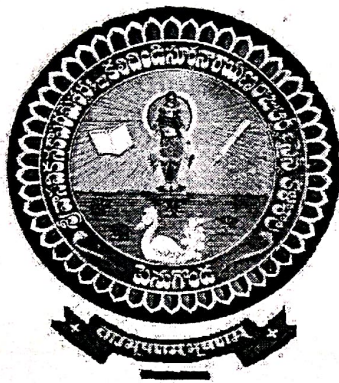
Accredited by NAAC with "A" Grade

& 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)**

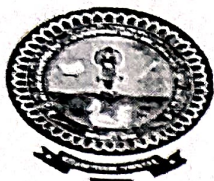


**BOS Meeting – VII**

**On 15-10-2025**

**BOARD OF STUDIES OF**  
**CHEMISTRY**

**2025 – 26**



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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-VII**

The Meeting of the board of Studies in Chemistry is held will be on 15-10-2025 at 10.30 AM in the Department of Chemistry.

**Members Present:**

S.No.	Name	Designation
1	Sri P. S. Phani Krishna, Head, Dept. of Chemistry S.V.K.P. & Dr. K.S. Raju Arts & Science College (A), Penugonda	Chairman
2	Dr. B. Jagannathan Reddy, Professor & Placement Officer, Department of Chemistry Adikavi Nannaya University, Rajamahendravaram. 9441159874, ramug1971@gmail.com	University Nominee
3	Dr. M.Sivanadh, Principal, A. G & S. G Siddhartha Degree College of Arts & Science (A), Vuyyuru - 52116 .A.P. 9381763303, sivanath23@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. K. Rajeswari, Lecturer in Chemistry SVKP & Dr. KS Raju Arts & Science College(A),Penugonda	Member
6	Smt. B. Radha Devi, Lecturer in Chemistry SVKP & Dr. KS Raju Arts & Science College(A),Penugonda	Member
7	Miss. N. D. Sravani, Lecturer in Chemistry SVKP & Dr. KS Raju Arts & Science College(A),Penugonda	Member
8	M. Lakshmipathi Rao, Laurus Synthesis Pvt.Labs Visakhapatnam 7995888511, raomagapu@gmail.com	Representative from Industry
9	Sri M. Ganesh Gupta, Lecturer, S.V.K.P. & P. V. Junior College, Penugonda, W. G. Dt., AP. 9949118497, ganeshgupta109@gmail.com	Alumni





  
PRINCIPAL  
S.V.K.P & DR. K.S. RAJU ARTS & SCIENCE COLLEGE (A)  
PENUGONDA-534320, W. G. DIST. A. P.

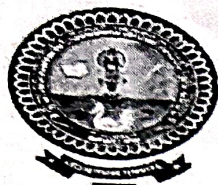
**Agenda:**

1. To frame the Syllabus, Blue Print and Model Question Papers (Theory & Practical) for Semester I and II of first Year for the Academic Year 2025-26 for the admitted batch 2025-26.
2. To frame the Syllabus, Blue Print and Model Question Papers (Theory & Practical) for Semester V of third Year for the Academic Year 2025-26 for the admitted batch 2023-24.
3. To discuss about the ratio of CIA(Continuous Internal Assessment) and SEE ( Semester End Examination) from the present ratio 30:70 to 40:60 for 2025-26 Admitted Batch onwards.
4. To Coordinate Teaching, Research, Extension and other Academic Activities in the Dept.
5. To suggest innovative teaching methods.
6. To submit proposal for conducting Seminars, Workshops etc.
7. To prepare syllabus for certificate/add on Programs.
8. To prepare a list of Examiners for Paper setting and valuation of papers
9. Any other matter.

**Resolution:**

1. Discussed and recommended that no changes are required in the proposed syllabi, Blue Print and Model Question papers for both External and Internal Examinations of Semester I and II for the admitted batch 2025-26.
2. Discussed and recommended that no changes are required in the proposed syllabi, Blue Print and Model Question papers for both External and Internal Examinations of Semester V for the admitted batch 2023-24.
3. It is resolved to change the ratio of CIA(Continuous Internal Assessment) and SEE ( Semester End Examination) from the present ratio 30:70 to 40:60 for 2025-26 Admitted Batch onwards.
4. Faculty of the Department are advised to concentrate on Research work and Extension Activities by attending Seminars, Workshops and Guest Lectures etc.
5. Faculty of the Department are advised to use more ICT methods.
6. It is resolved to send proposals to UGC or any other funding agency for National Seminar/ Workshops etc.
7. Resolved to approve the syllabus for certificate/add on programs.
8. It is resolved to approve the list of examiners prepared.

S.No.	Name	Designation	Signature
1	Sri P. S. Phani Krishna, Head, Dept. of Chemistry S.V.K.P. & Dr. K.S. Raju Arts & Science College (A), Penugonda	Chairman	P.S.P. Krishna
2	Dr. B. Jaganmohan Reddy, Professor & Placement Officer, Department of Chemistry Adikavi Nannaya University, Rajamahendravaram. 9441159874, <a href="mailto:ramug1971@gmail.com">ramug1971@gmail.com</a>	University Nominee	
3	Dr. M.Sivanadh, Principal, A. G & S. G Siddhartha Degree College of Arts & Science (A), Vuyyuru - 52116 .A.P. 9381763303, <a href="mailto:sivanath23@gmail.com">sivanath23@gmail.com</a>	Subject Expert	
4	Sri S. Anil Dev, Dept. of Chemistry, D. N. R. College (A), Bhimavaram, W. G. Dt., A.P. 8179179899, <a href="mailto:anildevs1974@gmail.com">anildevs1974@gmail.com</a>	Subject Expert	S. Anil Dev
5	Miss. K. Rajeswari, Lecturer in Chemistry SVKP & Dr. KS Raju Arts & Science College(A), Penugonda	Member	K. Rajeswari
6	Smt. B. Radha Devi, Lecturer in Chemistry SVKP & Dr. KS Raju Arts & Science College(A), Penugonda	Member	B. Radha Devi
7	Miss. N. D. Sravani, Lecturer in Chemistry SVKP & Dr. KS Raju Arts & Science College(A), Penugonda	Member	N. Sravani
8	M. Lakshmipathi Rao, Laurus Synthesis Pvt.Labs Visakhapatnam 7995888511, <a href="mailto:raomagapu@gmail.com">raomagapu@gmail.com</a>	Representative from Industry	
9	Sri M. Ganesh Gupta, Lecturer, S.V.K.P. & P. V. Junior College, Penugonda, W. G. Dt., AP. 9949118497, <a href="mailto:ganeshgupta109@gmail.com">ganeshgupta109@gmail.com</a>	Alumni	M. Ganesh Gupta



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## I- SEMESTER

### COURSE 1 : GENERAL CHEMISTRY

Credits: 03

#### I. LEARNING OBJECTIVES:

1. To understand the structure of the atom and its relation to periodic properties.
2. To explain different types of chemical bonding - ionic, covalent, metallic, hydrogen bonding.
3. To apply bonding theories to predict molecular structure and bonding nature.
4. To correlate periodic trends with physical and chemical properties of elements.
5. To evaluate practical applications of nuclear chemistry in science and industry

#### II. COURSE OUTCOMES:

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

1. Describe the electronic configuration of elements and periodic trends.
2. Analyze the formation and properties of ionic and covalent compounds.
3. Apply VSEPR, hybridization and MOT to predict molecular geometry and bonding.
4. Explain metallic bonding, hydrogen bonding, and intermolecular forces and relate them to physical properties.
5. Explain types of radioactivity, nuclear reactions and real-life applications.

#### III. SYLLABUS

##### UNIT-1: ATOMIC STRUCTURE AND PERIODIC TABLE

(9h)

Electronic configuration - Aufbau principle, Hund's rule and Pauli's exclusion principle. Periodic law and arrangement of elements in the periodic table, horizontal, vertical, and diagonal relationships in the periodic table. Definition and periodic trends of atomic radii, ionic radii, covalent radii, ionization potential, electron affinity, and electro negativity, Pauling scale, variable valency, inert-pair effect.

## UNIT-2: IONIC BOND

(9h)

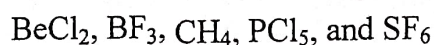
Properties of ionic compounds, factors favouring the formation of ionic compounds, Lattice energy: definition, factors affecting lattice energy, Born-Haber cycle - enthalpy of formation of ionic

Compound and stability, Covalent character in ionic compounds - polarization and Fajan's rules, effects of polarization.

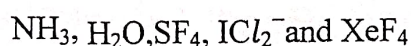
## UNIT-3: COVALENT BOND

(9h)

**Valence Bond theory:** Hybridization of atomic orbitals and geometry of molecules -



**VSEPR model:** Effect of bonding and nonbonding electrons on the structure of molecules -



**Molecular orbital theory:** LCAO method, construction of M.O. diagrams for homo nuclear and hetero nuclear diatomic molecules ( $\text{N}_2$ ,  $\text{O}_2$ ,  $\text{CO}$  and  $\text{NO}$ )

## UNIT-4: METALLIC AND HYDROGEN BONDS

(9h)

**Metallic bond:** Metallic properties, free electron theory, band theory of metals.

Explanation of conductors, semiconductors and insulators.

**Hydrogen bonding:** Intra and Inter-molecular hydrogen bonding, influence on the physical properties of molecules, Vander waal's forces, dipole-dipole interactions.

## UNIT-5: NUCLEAR CHEMISTRY

(9h)

Definition, Isotopes, n/p ratio, binding energy, types of radioactivity, Soddy-Fajan's displacement law, Law of Radioactivity, Radioactive decay series, Nuclear Reactions- Fission and Fusion, Applications of radioactivity in agriculture and medicine.

## IV. REFERENCES:

1. J.D.Lee, Concise Inorganic Chemistry, 5<sup>th</sup>ed., Blackwell Science, London, 1996.
2. B. R. Puri, L.R. Sharma, K.C. Kalia, Principles of Inorganic Chemistry, Shoban Lal Nagin Chand and Co., 1996.
3. D.F. Shriver and P.W. Atkins, Inorganic Chemistry, 3<sup>rd</sup>ed., W.H. Freeman and Co, London,
4. James E. Huheey, **Inorganic Chemistry: Principles of Structure and Reactivity**, 4<sup>th</sup>ed., 2017.
5. W.U. Malik, G.D. Tuli, R.D. Madan, Selected Topics in Inorganic Chemistry, S. Chand Publishing, 1998.
6. H.J. Arnikar, Essentials of Nuclear Chemistry, New Age International Publishers, 2015.

## V. PROPOSED ACTIVITIES:

1. Charton periodic trends like radii, ionization energy, electro negativity across groups/periods.
2. Work sheet solving – MOT diagrams and hybridization problems.
3. Model Building – Build 3D structures using kits/software for CH<sub>4</sub>, PCl<sub>5</sub>, XeF<sub>4</sub> etc.

## VI. CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS

1. Continuous Internal Evaluation (CIA): Monitoring the progress of student's learning.
2. Class Tests, Worksheets, Quizzes, Industrial/Field visits, Student seminars, Poster and PPT presentations, Peer learning, Project-based learning, Assignments, Debates, Group Discussions: Enhances critical thinking skills.
3. Semester End Examination (SEE): Critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

### APPROVED BY

(University Nominee)

  
(Subject Expert 1)

(Academician)

  
K. Bahari

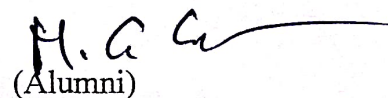
(Chairman)

  
P.S.P. Krishna

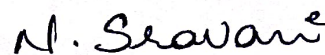
(Subject Expert 2)

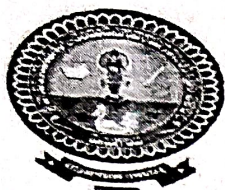
  
S. N. A.

(Alumni)

  
M. A. C.

  
B. J. Keller

  
N. Sravani



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## I- SEMESTER

### COURSE 1 : QUALITATIVE ANALYSIS OF SIMPLE SALT

Credits: 01

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#### I. LEARNING OBJECTIVES:

1. To understand the theoretical principles behind classical qualitative analysis of cations and anions.
2. To develop the ability to identify common cations and anions in inorganic salts.
3. To practice laboratory safety and correct handling of reagents.
4. To record and interpret observations accurately in systematic salt analysis.

#### II. COURSE OUTCOMES:

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

1. Proper use of glassware, equipment and chemicals in the laboratory
2. Apply systematic procedures to identify one cation and one anion in a given inorganic salt.
3. Analyze reactions based on solubility, color changes and precipitate formation.
4. Interpret results to draw conclusions and confirm the identity of ions.

#### III. SYLLABUS:

Analysis of simple salt containing **one anion and one cation** from the following:

**Anions:** Carbonate, sulphate, chloride, bromide, acetate, nitrate, borate, phosphate.

**Cations:** Lead, copper, iron, aluminium, zinc, nickel, manganese, calcium, strontium, barium, Ammonium.

#### IV. REFERENCES


1. G.Svehla, Vogel's Text book of Qualitative Inorganic Analysis, Pearson Education, 2008.
2. K. Nagaraj, S. Kamalesu, S. Lokhandwala, N.M. Parekh, Textbook of Semi-micro Inorganic Qualitative Analysis, Notion Press, 2023.
3. G. Pass, H. Sutcliff, Practical Inorganic Chemistry. 2<sup>nd</sup> edition, John-Wiley & Sons, 2020.

#### V. CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS

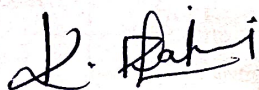
1. Internal Practical Assessment
2. Lab Record Evaluation
3. Final Practical Examination
4. Oral/Viva Voice

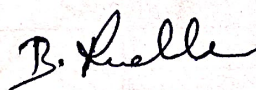
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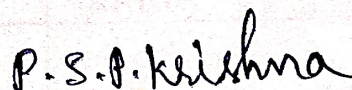
(University Nominee)

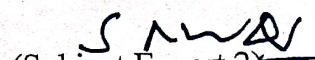
  
(Subject Expert 1)

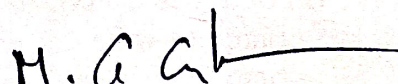
(Academician)

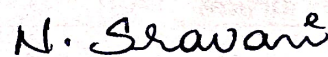
  
D. Dahi

  
B. Kelle

  
(Chairman)

  
(Subject Expert 2)

  
(Alumni)

  
N. Sravani



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**GENERAL CHEMISTRY (25CHE11)  
THE BLUEPRINT FOR CIA**

**Section-A:** Answer any three questions out of five questions.  
Each question carries 6 marks.

3x6=18 marks

**Section-B:** Answer any three questions out of five questions.  
Each question carries 4 marks.

3x4=12 marks

Mid Term Examination – I					
Unit	Section-A	Section-B	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit I	2	2	5	5	40
Unit II	2	2			
Unit III	1	1			
Total	5(3X6=18M)	5(3X4=12M)			
Mid Term Examination – II					
Unit	Section-A	Section-B	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit III	1	1	5	5	40
Unit IV	2	2			
Unit V	2	2			
Total	5(3X6=18M)	5(3X4=12M)			

**THE BLUEPRINT FOR SEE**

**Part-1:** Answer any five questions choosing at least two from each Section A & Section B.  
Each question carries 8 marks.

5x8=40 marks

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

5x4=20 marks

Unit	Part-1		Part-2	Total Marks
	Section-A	Section-B		
Unit I	2	0	2	24
Unit II	2	0	1	20
Unit III	1	1	2	24
Unit IV	0	2	2	24
Unit V	0	2	1	20
	5	5	8	112

APPROVED BY

(University Nominee)

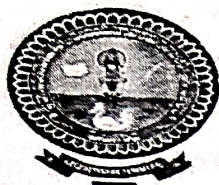
(Subject Expert 1)

(Academician)

(Chairman)

(Subject Expert 2)

(Alumni)



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**GENERAL CHEMISTRY (25CHE11)**  
**MODEL QUESTION PAPER**

**Time : 3Hrs**

**Max.Marks:60**

**PART – 1**

**Answer any five questions choosing atleast two from each section.**

**Each question carries 8 marks.**

**5x8=40 marks**

**Section-A**

1. Explain Aufbau principle, Hund's rule and Pauli's exclusion principle.
2. Explain periodic properties .Explain how the properties vary in periods and groups
3. Define Lattice energy .Write the factors affecting on Lattice energy.
4. Explain about Fajan's rule.
5. Write about valence bond theory and explain the structure of  $\text{BF}_3$  and  $\text{PCl}_5$

**Section-B**

6. Explain about Molecular orbital theory and construction of M.O diagram of  $\text{N}_2$  Molecule.
7. Write about Band theory of metals.
8. Explain the concept of Free electron theory.
9. Explain Soddy –Fajan's displacement law& law of Radioactive decay series
10. Write nuclear fission and nuclear fusion with examples.

PART - 2

Answer any five questions. Each question carries 4 marks.

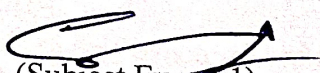
5x4=20 marks

11. Write a note on Inert pair effect.
12. Explain the diagonal relationship in the periodic table..
13. Write a short note on Ionic compounds.
14. Explain the structure of  $\text{BeCl}_2$  and  $\text{CH}_4$ .
15. Draw the M.O. diagram of CO molecule
16. Define Hydrogen bonding. And explain the types of Hydrogen bonding.
17. Write a short note on Ion Dipole -Dipole interactions.
18. Define Isotopes .Give any two examples.


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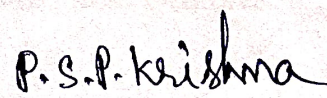
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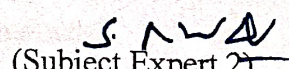
(University Nominee)

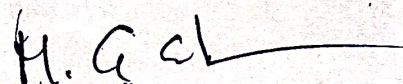
  
(Subject Expert 1)

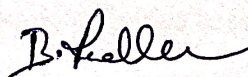
(Academician)

  
K. Bahi

  
(Chairman)

  
(Subject Expert 2)

  
(Alumni)

  
B. Keller

  
N. Sravan



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**I – SEMESTER  
COURSE 2: INORGANIC CHEMISTRY.**

**Credits: 03**

**I. LEARNING OBJECTIVES:**

1. To explain preparation and uses of selected p-block compounds.
2. To understand the structural and chemical properties of selected p-block compounds.
3. To classify and analyze the characteristics of d- and f-block elements.
4. To compare the properties of lanthanides and actinides.
5. To understand the processes involved in the extraction of metals from their ores.

**II. COURSE OUTCOMES:**

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

6. Explain the structures and preparation of key p-block compounds.
7. Classify d- and f-block elements and discuss their properties and oxidation states.
8. Analyze magnetic, catalytic and color properties of transition metals.
9. Compare and contrast lanthanides and actinides based on electronic configuration.
10. Explain and differentiate various metallurgical processes used in the extraction of metals.

**III. SYLLABUS:**

**UNIT-1: CHEMISTRY OF p – BLOCK ELEMENTS – I**

**(9h)**

**Group13:** Preparation and structure of Diborane, Borazine and  $(BN)_x$ .

**Group14:** Preparation, classification and uses of silicones.

**Group15:** Preparation and structure of Phosphonitrilic Chloride  $P_3N_3Cl_6$ .

**UNIT-2: CHEMISTRY OF p – BLOCK ELEMENTS – II** (9h)

**Group16:** Classification of oxides, structures of oxides and oxoacids of sulphur.

**Group17:** Preparation and structures of Inter halogen compounds, Pseudo halogens.

**UNIT-3: CHEMISTRY OF d-BLOCK ELEMENTS** (9h)

Characteristics of d-block elements with special reference to electronic configuration, variable valency, colour, magnetic properties, catalytic properties and ability to form complexes. Stability of various oxidation states of 3d-series.

**UNIT-4: CHEMISTRY OF f-BLOCK ELEMENTS** (9h)

**Chemistry of Lanthanides:** Electronic configuration, oxidation states, colour, magnetic properties, Lanthanide contraction, consequences of lanthanide contraction.

**Chemistry of Actinides:** Electronic configuration, oxidation states, actinide contraction, Comparison of lanthanides and actinides.

**UNIT-5: GENERAL PRINCIPLES OF METALLURGY** (9h)

Occurrence of metals, minerals and ores, Concentration of ores- levigation, magnetic separation, froth floatation, leaching, Conversion of concentrated ores to oxide- calcinations and roasting, reduction of oxide to the metal, Refining of crude metal - distillation, liquation, poling, electrolysis, zone refining and vapour phase refining, Corrosion and its prevention, Alloys.

**IV. REFERENCES:**

1. J.D.Lee, Concise Inorganic Chemistry, 5<sup>th</sup>ed., Black well Science, London, 1996.
2. B.R. Puri, L.R. Sharma, K.C. Kalia, Principles of Inorganic Chemistry, Shoban Lal NaginChand and Co.,1996.
3. D.F. Shriver, P.W. Atkins, Inorganic Chemistry, W.H. Freeman and Co, London, 1999.
4. J. E. Huheey, **Inorganic Chemistry: Principles of Structure and Reactivity**, 4<sup>th</sup>ed., 2017.
5. A.K. Das, Fundamentals of Metallurgy.Tata Mc Graw Hill Education, 2011.

## V. PROPOSED ACTIVITIES:

1. Group discussion: Trends in d- block and f-block properties across periods and groups.
2. Comparative work sheet: Lanthanide vs Actinide behaviour.
3. Seminar: Uses of metals in daily life.


## VI. CO – CURRICULAR ACTIVITIES AND ASSESSMENT METHODS:

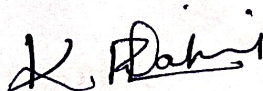
1. Continuous Internal Evaluation (CIA): Monitoring the progress of student's learning.
2. Class Tests, Worksheets, Quizzes, Industrial/Field visits, Student seminars, Poster and PPT presentations, Peer learning, Project based learning, Assignments, Debates, Group Discussions: Enhances critical thinking skills.
3. Semester End Examination (SEE): Critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

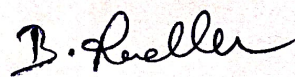
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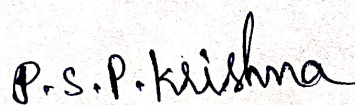
(University Nominee)

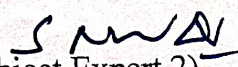
  
(Subject Expert 1)

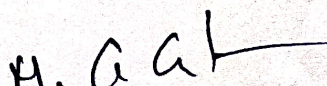
(Academician) 

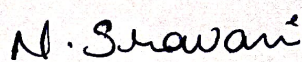


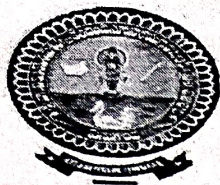


  
(Chairman)

  
(Subject Expert 2)

  
(Alumni)





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**I- SEMESTER**  
**COURSE: INORGANIC PREPARATIONS**  
**Credits: 01**

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**I. LEARNING OBJECTIVES:**

1. To understand and apply stoichiometry and principles of inorganic salt preparation.
2. To learn techniques such as crystallization, filtration, and drying.
3. To calculate percentage yields.
4. To handle reagents and lab apparatus safely and precisely

**II. COURSE OUTCOMES:**

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

1. Demonstrate safe use of laboratory equipment and chemical handling.
2. Describe the theoretical background for the preparation of inorganic salts.
3. Perform synthesis of potash alum, ferrous salts, and cuprous chloride following proper procedures.
4. Analyze colour changes, crystal formation, and yields to evaluate reaction completion.

**III. SYLLABUS:**

1. Preparation of Potash alum.
2. Preparation of Ferrous oxalate
3. Preparation of Ferrous ammonium sulphate.
4. Preparation of Cuprous chloride.
5. Preparation of Chrome alum.

#### IV. REFERENCES:

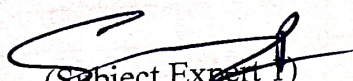
1. G. Svehla, Vogel's Text book of Qualitative Inorganic Analysis, Pearson Education, 2008.
2. G. H. Jeffery, J. Bassett, J. Mendham, R.C. Denney, Vogel's Textbook of Quantitative Chemical Analysis, John Wiley and Sons, 1989.

#### V. CO – CURRICULAR ACTIVITIES AND ASSESSMENT METHODS:

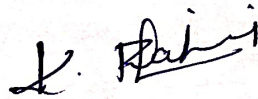
1. Internal Practical Assessment
2. Lab Record Evaluation
3. Final Practical Examination
4. Oral / Viva Voice.

#### APPROVED BY

(University Nominee)

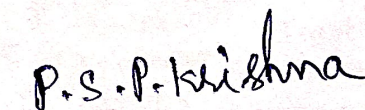
  
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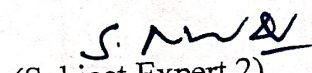
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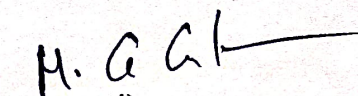
  
K. Bahari

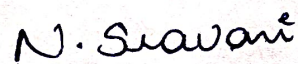


  
B. Soller

  
(Chairman)

  
(Subject Expert 2)

  
(Alumni)

  
N. Srivani



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## INORGANIC CHEMISTRY (25CHE12)

### THE BLUEPRINT FOR CIA

**Section-A:** Answer any three questions out of five questions.

Each question carries 6 marks.

3x6=18 marks

**Section-B:** Answer any three questions out of five questions.

Each question carries 4 marks.

3x4=12 marks

Mid Term Examination - I					
Unit	Section-A	Section-B	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit I	2	2	5	5	40
Unit II	2	2			
Unit III	1	1			
Total	5(3X6=18M)	5(3X4=12M)			
Mid Term Examination - II					
Unit	Section-A	Section-B	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit III	1	1	5	5	40
Unit IV	2	2			
Unit V	2	2			
Total	5(3X6=18M)	5(3X4=12M)			

### THE BLUEPRINT FOR SEE

**Part-1:** Answer any five questions choosing at least two from each Section A & Section B.

Each question carries 8 marks.

5x8=40 marks

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

5x4=20 marks

Unit	Part-1		Part-2	Total Marks
	Section-A	Section-B		
Unit I	2	0	2	24
Unit II	2	0	1	20
Unit III	1	1	2	24
Unit IV	0	2	1	20
Unit V	0	2	2	24
	5	5	8	112

APPROVED BY

(University Nominee)

(Subject Expert 1)

(Academician)

L. Bahari

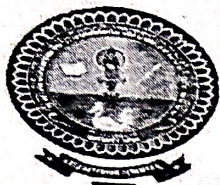
P. S. P. Krishna  
(Chairman)

(Subject Expert 2)

M. A. A.  
(Alumni)

B. Keeller

N. Serawan



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**INORGANIC CHEMISTRY (25CHE12)**  
**MODEL QUESTION PAPER**

Time : 3Hrs

Max.Marks:60

**PART – 1**

Answer any five questions choosing atleast two from each section.

Each question carries 10 marks.

5x8=40 marks

**Section-A**

1. What are Silicones .Give it's two preparation methods and its uses.
2. Write the synthesis and structure of Diborane.
3. Explain the classification of Oxides based on  
(i) Oxygen content                      (ii) Chemical nature.
4. Write the preparation and structure of inter halogen compounds.
5. Explain Electronic Configuration and Catalytic properties of d block elements of 3d series

**Section-B**

6. Explain stability of various oxidation states of 3d series.
7. Write Electronic Configuration and Oxidation States of 4f – block elements.
8. Explain actinide contraction and Comparison of lanthanides and actinides.
9. Write a note on (i) Levigation of ore      (ii) Froth Flootation Process.
10. Write briefly any four Refining Processes.

PART – 2

Answer any five questions. Each question carries 4 marks.

5x4=20 marks

11. Write the Preparation and Structure of Borazine?
12. Explain about Phosphonitrilic Chloride?
13. What are Pseudo halogens, write Preparations of Pseudo halogens.
14. Explain the magnetic properties of d – block elements.
15. Write about Colour of d – block elements.
16. Write about Lanthanide Contraction.
17. Write a short note on Leaching process.
18. Write about Magnetic Separation of Ores.

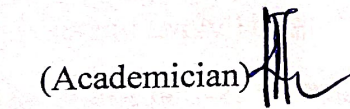
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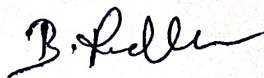
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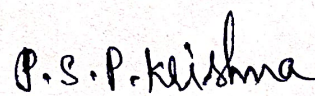
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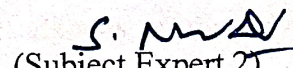
  
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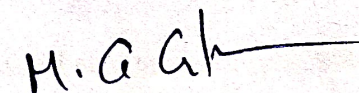
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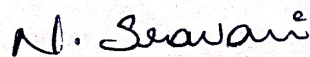
  
K. Bahari

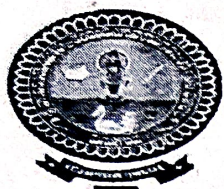
  
B. P. Reddy

  
(Chairman)

  
(Subject Expert 2)

  
(Alumni)

  
N. Seavari



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### II - SEMESTER

#### Course 3: ORGANIC CHEMISTRY - I

Credits: 03

#### I. LEARNING OBJECTIVES:

1. To understand the structural theory behind reactivity in organic chemistry.
2. To identify and classify hydrocarbons, their reactions, and stability.
3. To explain organic reaction mechanisms and orientation in aromatic substitution.
4. To apply concepts like resonance, inductive effects, hyper conjugation, and aromaticity.
5. To analyze stereo chemistry through molecular representations and optical activity.

#### II. COURSE OUTCOMES:

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

1. Study Inductive effect, Mesomeric effect, Hyper conjugation and its applications.
2. Explain the preparation and chemical properties of alkanes, alkenes, alkynes and benzenè.
3. Analyze and apply Hackle's rule to benzanoid and non-benzanoid aromatic compounds.
4. Differentiate between Markownikoff and Anti-Markownikoff addition, Ring activating and deactivating groups.
5. Interpret stereo chemical representations and identify chiral molecules.

#### III. SYLLABUS:

##### UNIT-1: STRUCTURAL THEORY INORGANIC CHEMISTRY

(9 h)

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

## UNIT-2: SATURATED HYDROCARBONS (ALKANES & CYCLOALKANES) (9 h)

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

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

**Cyclo alkanes:** Cyclo alkanes and their relative stability, Baeyer strain theory, Cyclohexane conformations with energy diagram.

## UNIT-3: UNSATURATED HYDROCARBONS (ALKENES & ALKYNES) (9 h)

**Alkenes:** Preparation of alkenes by dehydration of alcohols, Saytzeff's and Hofmann eliminations, Electrophilic Additions of  $X_2$ ,  $H_2O$ ,  $HX$  to alkene, Markownikoff and Anti-markownikoff addition, Ozonolysis, Diels-Alder reaction, 1,2- and 1,4-addition reactions in conjugated dienes.

**Alkynes:** Additions of  $X_2$ ,  $H_2O$ ,  $HX$  to alkynes, acidity and alkylation of terminal alkynes.

## UNIT-4: BENZENE & ITS REACTIVITY (9 h)

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

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

## UNIT-5: STEREO CHEMISTRY OF CARBON COMPOUNDS (9h)

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

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

#### IV. REFERENCES:

1. R. N. Morrison, R. N. Boyd, Organic Chemistry, Pearson Education, 7<sup>th</sup> edition, 2010.
2. Peter Sykes, Guide book to Mechanism in Organic Chemistry, 6<sup>th</sup> edition, 1985.
3. S.P. Singh, O. Prakash, Reaction mechanism in organic chemistry, Laxmi Publications, 2017.
4. P.Y. Bruice, Organic Chemistry, 8<sup>th</sup> Edition, Pearson, 2017.
5. V.K. Ahluwalia, P. Bhagat, R. Aggarwal, R. Chandra, Intermediate for Organic Synthesis, I. K. International, 2005.
6. T.W.G. Solomons, C.B. Fryhle, S.A. Snyder, Organic Chemistry, 12<sup>th</sup> Edition, Wiley, 2016.
7. P.S. Kalsi, Stereo chemistry, New Age International, 2015.
8. D. Nasipuri, Stereo chemistry of organic compounds, New Age International, 2020.

#### V. PROPOSED ACTIVITIES:

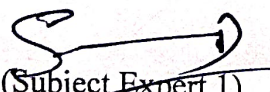
1. Mechanism writing exercises-Electrophilic aromatic substitution, electrophilic additions.
2. Group quiz on directive effects and reactive intermediates.
3. Concept mapping-Properties of alkane, alkene, alkyne, benzene.

#### VI. CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS:


1. Continuous Internal Evaluation (CIA): Monitoring the progress of student's learning
2. Class Tests, Worksheets, Quizzes, Industrial/Field visits, Student seminars, Poster and PPT presentations, Peer learning, Project-based learning, Assignments, Debates, Group Discussions: Enhances critical thinking skills.
3. Semester End Examination (SEE): Critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

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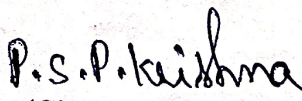
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(Subject Expert 1)

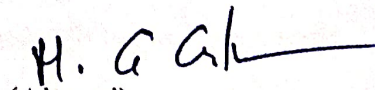
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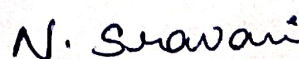
  
K. Bahini

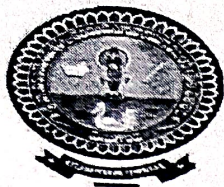
  
B. Sella

  
(Chairman)

  
(Subject Expert 2)

  
(Alumni)

  
N. Sravani



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**II - SEMESTER**  
**COURSE : 3 - ORGANIC PREPARATIONS**  
**Credits: 01**

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**I. LEARNING OBJECTIVES:**

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

**II. COURSE OUTCOMES:**

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

1. Describe the theoretical background and reaction mechanisms of organic preparations.
2. Synthesize organic compounds using standard laboratory procedures.
3. Analyze reaction steps and evaluate the melting point, and yield of synthesized products.
4. Relate synthesis methods to pharmaceutical and industrial applications.

**III. SYLLABUS:**

1. Preparation of tri bromo aniline
2. Preparation of p-nitro acetanilide
3. Preparation of nerolin
4. Preparation of aspirin (Acetylsalicylic acid)
5. Preparation of paracetamol (Acetaminophen)

**IV. REFERENCES:**

1. B.S. Furniss, A.J. Hannaford, P.W.G. Smith, A.R. Tatchell, Vogel's Text book of Practical Organic Chemistry, Pearson, 2012.
2. V.K. Ahluwalia, R. Agarwal, Comprehensive Practical Organic Chemistry, University Press, 2010.

**V. CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS:**


1. Internal Practical Assessment
2. Lab Record Evaluation
3. Final Practical Examination
4. Oral/Viva Voice

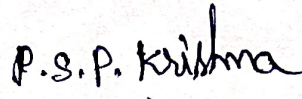
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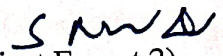
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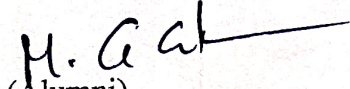
  
(Subject Expert 1)

(Academician)

  
K. Bahi

  
(Chairman)

  
(Subject Expert 2)

  
(Alumni)

B. Kellu

N. Seavari



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**ORGANIC CHEMISTRY - I (25CHE21)**  
**THE BLUEPRINT FOR CIA**

- Section-A:** Answer any three questions out of five questions. 3x6=18 marks  
Each question carries 6 marks.
- Section-B:** Answer any three questions out of five questions. 3x4=12 marks  
Each question carries 4 marks.

Mid Term Examination – I					
Unit	Section-A	Section-B	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit I	2	2	5	5	40
Unit II	2	2			
Unit III	1	1			
Total	5(3X6=18M)	5(3X4=12M)			
Mid Term Examination – II					
Unit	Section-A	Section-B	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit III	1	1	5	5	40
Unit IV	2	2			
Unit V	2	2			
Total	5(3X6=18M)	5(3X4=12M)			


**THE BLUEPRINT FOR SEE**

- Part-1:** Answer any five questions choosing at least two from each Section A & Section B. 5x8=40 marks  
Each question carries 8 marks.
- Part-2:** Answer any five questions. Each question carries 4 marks. 5x4=20 marks


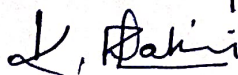
Unit	Part-1		Part-2	Total Marks
	Section-A	Section-B		
Unit I	2	0	2	24
Unit II	2	0	1	20
Unit III	1	1	1	20
Unit IV	0	2	2	24
Unit V	0	2	2	24
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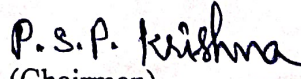
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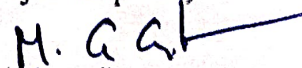
  
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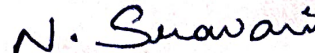
  


  
(Chairman)

  
(Subject Expert 2)

  
(Alumni)







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**ORGANIC CHEMISTRY – I (25CHE21)**

**MODEL QUESTION PAPER**

**Time : 3Hrs**

**Max.Marks:60**

**PART – 1**

**Answer any five questions choosing atleast two from each section.**

**Each question carries 8 marks.**

**5x8 = 40 marks**

**Section-A**

1. Write a brief note on Inductive effect and give its Applications?
2. Explain the Types of Organic Reactions.
3. Write the Substitution reactions of alkanes.
4. Define Cyclo Alkanes? Explain their stability on the basis of Baeyer strain theory.
5. Explain Saytzeff's and Hofmann eliminations with mechanism.

**Section-B**

6. Explain Markownikoff rule And Anti - Markownikoff rule with suitable examples?
7. Write a note on Orientation effect in Benzene?
8. Write the following reactions with mechanism  
(i) Friedel – Crafts Alkylation (ii) Friedel – Crafts Acylation
9. Explain Optical isomerism with Glyceraldehyde and Lactic acid.
10. Draw the Wedge, Fischer, New - Mann and Saw - Horse representation for Tartaric acid?

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. Define Hyper conjugation with suitable examples.
13. Write about Corey – House synthesis.
14. Write a short note on Diels – Alder reaction.
15. Write Halogenation of Benzene with mechanism.
16. Define Huckel rule with suitable examples?
17. Define Enantiomers and Diastereomers with examples.
18. Write a short note on Optical Activity.

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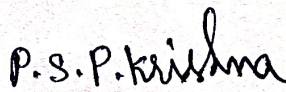
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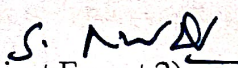
  
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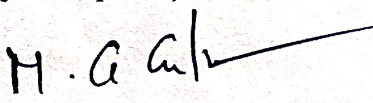
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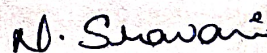
  
K. Bahi

  
B. S. S. S.

  
P. S. P. Krishna  
(Chairman)

  
(Subject Expert 2)

  
H. A. A.  
(Alumni)

  
N. S. S.



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**II - SEMESTER**  
**Course 4: PHYSICAL CHEMISTRY**  
**Credits: 03**

**I. LEARNING OBJECTIVES:**

1. To understand the theoretical principles governing gases, liquids, solids and colloidal systems.
2. To apply gas laws and interpret the behavior of real and ideal gases.
3. To describe physical properties of matter in various states and relate them to structural features.
4. To interpret phase diagrams and apply Gibbs' phase rule to one- and two-component systems.

**II. COURSE OUTCOMES:**

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

1. Explain gas laws, ideal and real gases behavior, and critical phenomena.
2. Describe properties of liquids and classify types and applications of liquid crystals.
3. Derive Bragg's equation and identify types of crystal defects.
4. Apply the phase rule to interpret phase diagrams and systems with eutectic/ congruent / incongruent points.
5. Differentiate between types of adsorption and colloidal systems, and evaluate their applications.

**III. SYLLABUS:**

**UNIT-1: GASEOUS STATE**

**(9h)**

Gas laws, Ideal Gas equation, Vander Waal's equation of state, Andrew's isotherms of carbon dioxide, Critical phenomena, Relationship between critical constants and vander Waal's constants, Law of corresponding states, Joule-Thomson effect, Inversion temperature.

## UNIT-2: LIQUID STATE

(9 h)

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

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

## UNIT-3: SOLID STATE

(9h)

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

## UNIT-4: PHASE RULE

(9h)

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

## UNIT-5: SURFACE CHEMISTRY

(9 h)

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

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

## IV. REFERENCES:

1. P.W. Atkins, J.de., Paula, Atkin's Physical Chemistry, 10<sup>th</sup> Edition, Oxford University Press, 2014.
2. D.W. Ball, Physical Chemistry, 2<sup>nd</sup> Edition, Cengage Learning, 2017.
3. G.W. Castellan, Physical Chemistry, 4<sup>th</sup> Edition, Narosa, 2014.
4. K.L. Kapoor, A Text book of Physical Chemistry, 6<sup>th</sup> Edition, McGraw-Hill Education, 2015.

## V. PROPOSED ACTIVITIES:

1. Model building: Bravais lattices and symmetry in crystals
2. Chart preparation of phase diagrams (Water, Pb-Ag, NaCl-H<sub>2</sub>O)
3. PPT: Adsorption isotherms or colloidal behavior.
4. List out applications of Liquid crystals in different display devices.
5. Peer Teaching: Phase rule and eutectic systems

## VI. CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS:

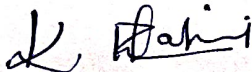
1. Continuous Internal Evaluation (CIA): Monitoring the progress of student's learning
2. Class Tests, Work sheets, Quizzes, Industrial/Field visits, Student seminars, Poster and PPT presentations, Peer learning, Project-based learning, Assignments, Debates, Group Discussions: Enhances critical thinking skills.
3. Semester End Examination (SEE): Critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

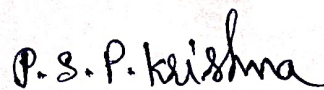
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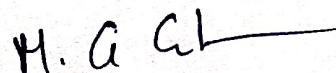
  
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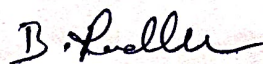
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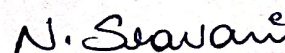
  
K. Bahari

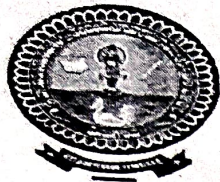
  
(Chairman)

  
(Subject Expert 2)

  
(Alumni)

  
B. S. S. S. S.

  
N. Sevani



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## **COURSE – 4: PHYSICAL CHEMISTRY- I (Credits: 01)**

### **I. LEARNING OBJECTIVES:**

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

### **II. COURSE OUTCOMES:**

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

1. Use glass ware, equipment and follow experimental procedures in the laboratory.
2. Determine surface tension and viscosity using standard experimental techniques.
3. Prepare colloidal solutions and study their stability.
4. Conduct adsorption experiments and verify Freundlich isotherm

### **III. 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 coefficient of viscosity of an organic liquid.
4. Preparation of sols:  $\text{Al}(\text{OH})_3$ ,  $\text{Fe}(\text{OH})_3$  and starch.
5. Adsorption of acetic acid on animal charcoal, verification of Freundlich isotherm.

### **IV. REFERENCES:**

1. B.D. Khosla, V.C. Garg, A. Gulati, Senior Practical Physical Chemistry, R. Chand & Co, New Delhi, 2015.
2. K.L. Kapoor, A Text book of Physical Chemistry, McGraw-Hill Education, 2019.

3. C.W. Garland, J.W. Nibler, D.P. Shoemaker, Experiments in Physical Chemistry, 8<sup>th</sup> Edition, McGraw-Hill, New York, 2003.


#### V. CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS:

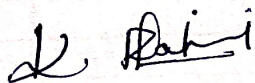
1. Internal Practical Assessment
2. Lab Record Evaluation
3. Final Practical Examination
4. Oral/Viva Voice

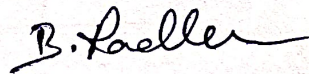
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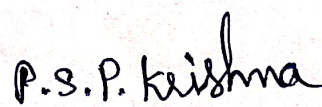
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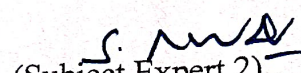
  
(Subject Expert 1)

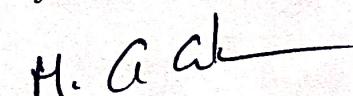
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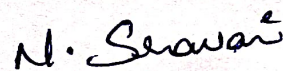


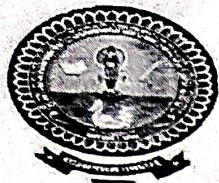


  
(Chairman)

  
(Subject Expert 2)

  
(Alumni)





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### PHYSICAL CHEMISTRY - I (25CHE22)

#### THE BLUEPRINT FOR CIA

**Section-A:** Answer any three questions out of five questions.

Each question carries 6 marks.

3x6=18 marks

**Section-B:** Answer any three questions out of five questions.

Each question carries 4 marks.

3x4=12 marks

Mid Term Examination - I					
Unit	Section-A	Section-B	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit I	2	2	5	5	40
Unit II	2	2			
Unit III	1	1			
Total	5(3X6=18M)	5(3X4=12M)			
Mid Term Examination - II					
Unit	Section-A	Section-B	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit III	1	1	5	5	40
Unit IV	2	2			
Unit V	2	2			
Total	5(3X6=18M)	5(3X4=12M)			

#### THE BLUEPRINT FOR SEE

**Part-1:** Answer any five questions choosing at least two from each Section A & Section B.

Each question carries 8 marks.

5x8=40 marks

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

5x4=20 marks

Unit	Part-1		Part-2	Total Marks
	Section-A	Section-B		
Unit I	2	0	2	24
Unit II	2	0	2	24
Unit III	1	1	2	24
Unit IV	0	2	1	20
Unit V	0	2	1	20
	5	5	8	112

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(University Nominee)

(Subject Expert 1)

(Academician)

*K. Babu*

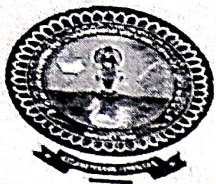
*B. Pralle*

*P. S. P. Krishna*  
(Chairman)

*S. M. S.*  
(Subject Expert 2)

*M. G. Ab.*  
(Alumni)

*N. Suvai*



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**PHYSICAL CHEMISTRY - I (25CHE22)**

**MODEL QUESTION PAPER**

**Time : 3Hrs**

**Max.Marks:60**

**PART - 1**

**Answer any five questions choosing atleast two from each section.**

**Each question carries 8 marks.**

**5x8 = 40 marks**

**Section-A**

1. Give the relationship between Vander Waals constant and Critical constants?
2. Explain Vander Waal equation of state?
3. Explain about Physical properties of Liquids?
4. Define and classify the Liquid Crystals.
5. Derive the Braggs equation.

**Section-B**

6. Explain about Crystal Defects?
7. Define Phase rule and Terms involved in it?
8. Explain Phase Diagram of One Component system - Water system?
9. Define (a) Coagulation of Collides (b) gold number.
10. Explain about Langmuir adsorption isotherm?

PART - 2

Answer any five questions. Each question carries 4 marks.

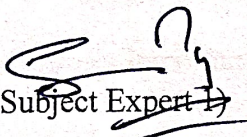
5x4=20 marks

11. Explain the isotherms of  $\text{CO}_2$ ?
12. Write the Joule - Thomson effect?
13. Write the Applications of Liquid Crystals?
14. Write the effect of various solutes on Surface Tension.
15. Explain about Law of Consistency of Interfacial angles.
16. Write about Symmetry in Crystals.
17. Write a short note on Freezing Mixtures.
18. Write the difference between Physical and chemical adsorption?


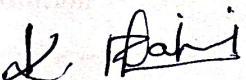
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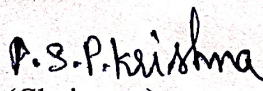
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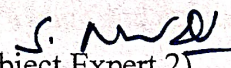
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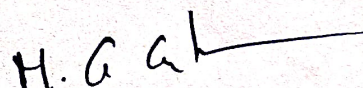
  
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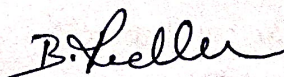
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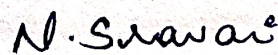
  


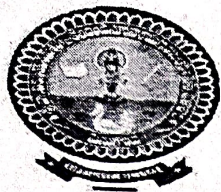
  
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(Subject Expert 2)

  
(Alumni)







**V- SEMESTER**  
**Course 12 B: ENVIRONMENTAL CHEMISTRY**  
**Credits: 03**

**Learning Outcomes:**

Students after successful completion of the course will be able to:

- 1) Understand the environment functions and how it is affected by human activities.
- 2) Acquire chemical knowledge to ensure sustainable use of the world's resources and
- 3) Ecosystems services.
- 4) Engage in simple and advanced analytical tools used to measure the different types of pollution.
- 5) Explain the energy crisis and different aspects of sustainability.
- 6) Analyze key ethical challenges concerning biodiversity and understand the moral principles, goals
- 7) Virtues important for guiding decisions that affect Earth's plant and animal life.

**SYLLABUS**

**UNIT-I ENVIRONMENTAL CHEMISTRY**

**9h**

Definition – Concept of Environmental chemistry-Scope and importance of environment in now a days – Nomenclature of environmental chemistry – Segments of environment-Effects of human activities on environment, – Natural resources-Renewable Resources-Solar and Biomass Energy and Nonrenewable resources – Thermal power and atomic energy – Reactions of atmospheric oxygen and Hydrological cycle.

**UNIT-II AIR POLLUTION**

**9h**

Definition – Sources of air pollution – Classification of air pollution – Ambient air quality standards- Climate change – Global warming – Pollution from combustion systems- Acid rain –Photochemical smog – Green house effect –

Formation and depletion of ozone –Bhopal gas disaster –Instrumental techniques to monitor pollution – Controlling methods of air pollution.

### **UNIT-III WATER POLLUTION**

9h

Unique physical and chemical properties of water – Water quality standards and parameters –Turbidity-Ph Dissolved oxygen –BOD, COD, Suspended solid total dissolved solids, alkalinity Hardness of water Methods to convert temporary hard water into soft water – Methods to convert permanent hard water into soft water – eutropication and its effects –Industrial waste water treatment.

### **UNIT-IV CHEMICAL TOXICOLOGY**

9h

Toxic chemicals in the environment – effects of toxic chemicals – cyanide and its toxic effects – pesticides and its biochemical effects – toxicity of lead, mercury, arsenic and cadmium- Solid waste management.

### **UNIT-V ECOSYSTEM AND BIODIVERSITY**

9h

**Ecosystem :** Concepts–structure–Functions and types of ecosystem– Abiotic and biotic components – Energy flow and Energy dynamics of ecosystem– Foodchains – Food web– Tropic levels– Biogeochemical cycles (carbon, nitrogen and phosphorus)

#### **Bio diversity:**

Definition – level and types of biodiversity – concept- significance – magnitude and distribution of biodiversity – trends-biogeographical classification of India – biodiversity at national, global and regional level,

#### **Suggested Co-Curricular Activities:**

- 1) Training of students by related industrial experts.
- 2) Assignments, Seminars, Group discussions, Debates and Quiz (on related topics).
- 3) Visits to laboratories, firms, research organizations etc.
- 4) Invited lectures and presentations on related topics by field/industrial experts.
- 5) Preparation of videos on tools, techniques on selected topics.

#### **List of Reference books:**


1. Fundamentals of ecology by M.C.Dash
2. A Text book of Environmental chemistry by W. Moore and F.A. Moore
3. Environmental Chemistry by Samir k.Banerji
4. Water pollution, Lalude, MC Graw Hill
5. Environmental Chemistry, Anil Kumar De, Wiley Eastern ltd.

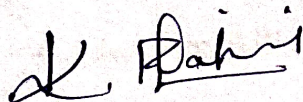
6. Environmental analysis, SM Khopkar ( IIT Bombay )
7. Environmental Chemistry by BK Sharma & H Kaur, Goel publishing house.
8. Fundamentals of Environmental Chemistry, Manahan, Stanley. E
9. Applications of Environmental Chemistry, Eugene R. Wiener
10. Web related references suggested by teacher.

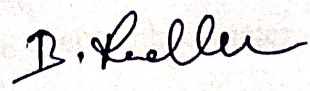
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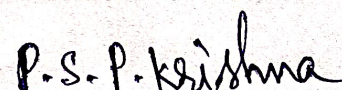
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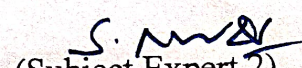
  
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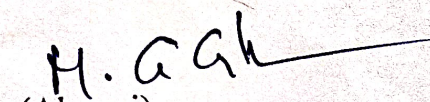
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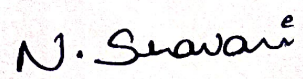


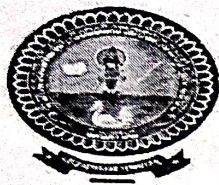


  
(Chairman)

  
(Subject Expert 2)

  
(Alumni)





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**V - SEMESTER**  
**Course 12 B: ENVIRONMENTAL CHEMISTRY**

**Credits: 01**

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**Environmental Chemistry**

**Learning Outcomes:**

On successful completion of this practical course, student shall be able to:

1. List out, Identify and handle various equipment in Chemistry lab.
2. Learn the procedures of preparation of standard solutions.
3. Demonstrate skills in operating instruments.
4. Acquire skills in handling spectrophotometer.
5. Analyze water and soil samples.

**Laboratory course Syllabus:**

1. Identification of various equipment in the laboratory.
2. Determination of carbonate and bicarbonate in water samples by double titration method.
3. Determination of Hardness of water using EDTA
  - a) Permanent hardness
  - b) Temporary hardness
4. Determination of Chlorides in water samples by Mohr's method.
5. Determination of pH, turbidity and total solids in water sample.
6. Determination of  $\text{Ca}^{+2}$  and  $\text{Mg}^{+2}$  in soil sample by flame photometry.
7. Determination of pH in soil samples using Ph metry.

## Suggested Co-Curricular Activities:

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

- 1) For Teacher: Skills training of students by the teacher in classroom, lab and field for not less than 15 hours on field related quantitative techniques for the water quality parameters, soil pollution and air pollution.
- 2) For Student: Individual visit to any one of the local field agencies/research laboratories in universities/research organizations/private sector culminating writing and submission of a handwritten fieldwork/project work Report not exceeding 10 pages in the given format.
- 3) Max marks for Field work / project work Report:05.
- 4) Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings and acknowledgements.
- 5) Unit tests (IE).

## List of Reference books:


1. A Text Book of Quantitative Inorganic Analysis(3<sup>rd</sup>Edition) –A.I.Vogel
2. Water pollution, Lalude, MC Graw Hill
3. Environmental analysis, SM Khopkar ( IIT Bombay )
4. Web related references suggested by teacher.

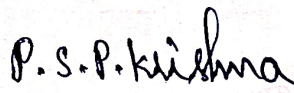
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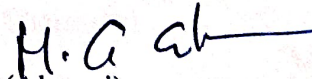
  
(Subject Expert 1)

(Academician)


  
(Chairman)

  
(Subject Expert 2)

  
(Alumni)







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

**ENVIRONMENTAL CHEMISTRY (23CHE51)**

**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	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	3				
Unit III	1				

**MID Examination II**

Unit	No.of Questions	No.of Questions to be answered	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit III	1	Any 4 (4 X 5 = 20 marks)	5	5	30
Unit IV	2				
Unit V	3				

**APPROVED BY**

(University Nominee)

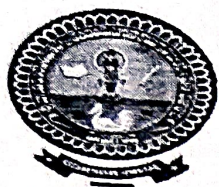
(Subject Expert 1)

(Academician)

(Chairman)

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(Alumni)



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## ENVIRONMENTAL CHEMISTRY (23CHE51)

### 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 the segments of the environment.
2. Write about Renewable energy resources.
3. Explain about Formation and Depletion of ozone layer?
4. Write about Acid Rains and Global Warming? Discuss their impact?
5. Explain the methods to convert Temporary & permanent hard water into soft water.

#### Section-B

6. Explain about BOD and COD.
7. Explain the toxicity of arsenic, cadmium and lead.
8. Explain about solid waste management
9. What are biogeochemical cycles? Explain with two examples.
10. Explain about biogeographical classification of India.

#### PART – 2

Answer any five questions. Each question carries 4 marks.

5x4=20 marks

11. Write a note on reactions of Atmospheric Oxygen.
12. Write a short note on Bhopal gas disaster.
13. Write a note on Eutropication and its effects.

14. Write note on water quality parameters and standards.
15. Explain the bio chemical effects of pesticides.
16. Explain about Photochemical Smog?
17. Explain about Food chain with reference to ecosystem.
18. Explain about Global Bio diversity


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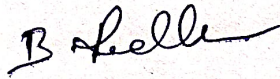
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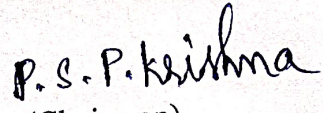
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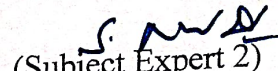
  
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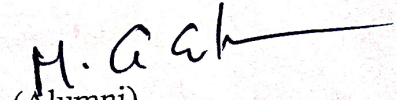
(Academician)

  
K. Ravi

  
B. Sella

  
(Chairman)

  
(Subject Expert 2)

  
(Alumni)

N. Sravani



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**V – SEMESTER**  
**Course 13 B: GREEN CHEMISTRY AND NANOTECHNOLOGY**

**Credits: 03**

**Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Understand the importance of Green chemistry and Green synthesis.
2. Engage in Microwave assisted organic synthesis.
3. Demonstrate skills using the alternative green solvents in synthesis.
4. Demonstrate and explain enzymatic catalysis .
5. Analyse alternative sources of energy and carry out green synthesis.
6. Carry out the chemical method of nanomaterial synthesis.

**SYLLABUS**

**UNIT-I GREEN CHEMISTRY: I**

**9hrs**

Introduction-Definition of green Chemistry, Need for green chemistry, Goals of Green chemistry Basic principles of green chemistry. Green synthesis- Evaluation of the type of the reaction i) Rearrangements (100% atom economic),ii)Addition reaction(100% atom economic). Organic reactions by Sonication method: apparatus required and examples of sono chemical reactions (Heck, Hunsdiecker and Wittig reactions).

**UNIT- II GREEN CHEMISTRY : Part- II**

**9hrs**

**A) Selection of solvent:**

- i) Aqueous phase reactions
- ii) Reactions in ionic liquids, Heck reaction, Suzuki reactions, epoxidation.iii)Solid supported synthesis

- B) Supercritical CO<sub>2</sub>: Preparation, properties and applications, (decaffeination, drycleaning)

**UNIT-III MICROWAVE AND ULTRASOUND ASSISTED GREEN SYNTHESIS: 9hrs**

Apparatus required, examples of MAOS (synthesis of fused anthroquinones, Leukart reductive amination of ketones)-Advantages and disadvantages of MAOS. Aldol condensation –Cannizzaro reaction - Diels-Alder reactions- Strecker's synthesis

**UNIT-IV GREEN CATALYSIS AND GREEN SYNTHESIS 9hrs**

Heterogeneous catalysis, use of zeolites, silica, alumina, supported catalysis- biocatalysis: Enzymes, microbes Phase transfer catalysis (micellar/surfactant)

1. Green synthesis of the following compounds : adipic acid, catechol, disodium imino diacetate (alternative Strecker's synthesis)

2. Microwave assisted reaction in water –Hoffmann elimination – methyl benzoate to benzoic acid – oxidation of toluene and alcohols–microwave assisted reactions in organic solvents. Diels-Alder reactions and decarboxylation reaction.

3. Ultrasound assisted reactions – sono chemical Simmons–Smith reaction (ultrasonic alternative to iodine)

**UNIT – V NANOTECHNOLOGY IN GREEN CHEMISTRY 9hrs**

Basic concepts of Nanoscience and Nanotechnology – Bottom-up approach and Top down approaches with examples – Synthesis of Nano materials – Classification of Nanomaterials – Properties and Application of Nanomaterials. Chemical and Physical properties of Nanoparticles – Physical synthesis of nanoparticles – Inert gas condensation - aerosol method  
Chemical Synthesis of nanoparticles – precipitation and co-precipitation method, sol-gel method.

**Suggested Co-Curricular Activities:**

- 1) Training of students by related industrial experts.
- 2) Assignments, Seminars, Group discussions, Debates and Quiz (on related topics).
- 3) Visits to laboratories, firms, research organizations etc.
- 4) Invited lectures and presentations on related topics by field/industrial experts.

- 5) Preparation of videos on tools, techniques and applications of Green chemistry and Nanosynthesis.

**List of Reference books:**


1. Green Chemistry Theory and Practical. P.T.Anatas and J.C. Warner
2. Green Chemistry V.K. Ahluwalia Narosa, New Delhi.
3. Real world cases in Green Chemistry M.C. Cann and M.E. Connelly
4. Green Chemistry: Introductory Text M.Lancaster: Royal Society of Chemistry(London)
5. Principles and practice of heterogeneous catalysis, Thomas J.M.,Thomas M.J., JohnWiley
6. Green Chemistry: Environmental friendly alternatives R S Sanghli and M.MSrivastava, Narosa Publications
7. Nanotechnology: Health and Environmental Risks, Jo Anne Shatkin, CRC Press(2008).
8. Green Processes for Nanotechnology: From Inorganic to Bioinspired Nanomaterials,Vladimir A. Basiuk, Elena V. Basiuk Springer (2015)
9. Web related references suggested by teacher.


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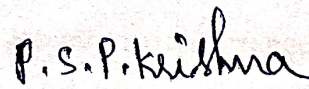
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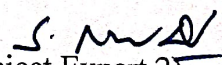
  
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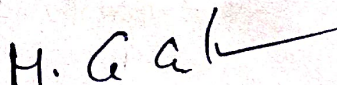
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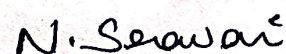
  
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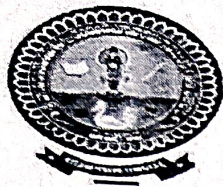
  
B. Keller

  
P.S.P. Krishna  
(Chairman)

  
(Subject Expert 2)

  
H. G. A. K.  
(Alumni)

  
N. Serawat



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**V- SEMESTER**  
**Course 13 B: Green Chemistry And Nanotechnology**

**Learning Outcomes:**

On successful completion of this practical course, student shall be able to:

1. List out, identify and handle various equipment in the laboratory.
2. Learn the procedures of green synthesis.
3. Demonstrate skills in the preparation of Nanomaterials.
4. Acquire skills in Microwave assisted organic synthesis.
5. Perform some applications of Nanomaterials.

**Laboratory course Syllabus:**

1. Identification of various equipment in the laboratory.
2. Acetylation of 1<sup>o</sup> amine by green method: Preparation of acetanilide
3. Rearrangement reaction in green conditions: Benzil - Benzilic acid rearrangement
4. Radical coupling reaction: Preparation of 1,1-bis -2-naphthol
5. Green oxidation reaction: Synthesis of adipic acid
6. Preparation and characterization of biodiesel from vegetable oil/ waste cooking oil
7. Preparation and characterization of Nanoparticles of gold using tea leaves.
8. Benzoin condensation using Thiamine Hydrochloride as a catalyst instead of cyanide.
9. Photoreduction of Benzophenone to Benzopinacol in the presence of sunlight.

## Suggested Co-Curricular Activities:

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

- 1) **For Teacher:** Training of students by the teacher in the classroom or in the laboratory for not less than 15 hours on field related quantitative techniques for Enzymatic catalysis, Microwave assisted organic synthesis, Biodiesel preparation etc
- 2) **For Student:** Student shall visit a related industry / chemistry laboratory in universities / research organizations/private sector facility and observe various methods used for the analysis of water. Write their observations and submit ahand written fieldwork /project work report not exceeding10pages in the given formatto the teacher.
- 3) **Max marks for Field work / project work Report:05.**
- 4) Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings and acknowledgements.
- 5) Unit tests (IE).

## List of Reference books:

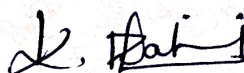
- 1) Green Chemistry Theory and Practical. P.T.Anatas and J.C. Warner
- 2) Green Chemistry V.K. Ahluwalia Narosa, New Delhi.
- 3) Real world cases in Green Chemistry M.C. Cann and M.E. Connelly
- 4) Green Chemistry: Introductory Text M.Lancaster: Royal Society of Chemistry(London)
- 5) Web related references suggested by teacher.

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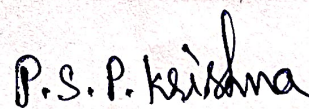
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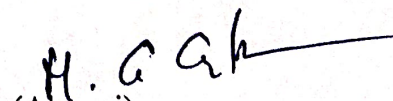
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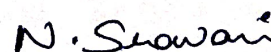


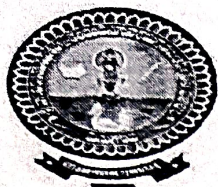


  
(Chairman)

  
(Subject Expert 2)

  
(Alumni)





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

### Green Chemistry and Nanotechnology(23CHE52)

**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	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	3				
Unit III	1				

### MID Examination II

Unit	No.of Questions	No.of Questions to be answered	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit III	1	Any 4 (4 X 5 = 20 marks)	5	5	30
Unit IV	2				
Unit V	3				

### APPROVED BY

(University Nominee)

(Subject Expert 1)

(Academician)

*L. Bahi*

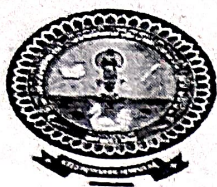
*B. Sella*

*P. S. P. Krishna*  
(Chairman)

*S. S. S.*  
(Subject Expert 2)

*A. A. A.*  
(Alumni)

*N. S. S.*



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## GREEN CHEMISTRY AND NANO TECHNOLOGY (23CHE52)

### 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 the basic principles of green chemistry.
2. Explain the sonication method for Huns dicker and Witting reactions
3. Describe the preparation and properties of super critical carbon dioxide (scCO<sub>2</sub>).
4. What are Ionic liquids? Explain Heck and Suzuki reactions in Ionic liquids ?
5. Explain the synthesis of fused anthro quinines by microwave assisted organic synthesis

#### Section-B

6. Describe the MAOS green synthetic procedure for the Diels-alder and Strecker's synthesis reaction
7. Explain Phase Transfer Catalysis reactions with examples?
8. How are Adipic acid and Catechol prepared by Green synthesis?
9. Discuss the classification and applications of Nonmaterial's.
10. Explain any two physical and chemical methods of synthesis of nonmaterial's?

PART - 2

Answer any five questions. Each question carries 4 marks.

5x4=20 marks

11. What is the need of green chemistry?
12. Discuss 100% atom economy reactions with example?
13. Explain solid supported synthesis.
14. Describe the green synthetic procedure for the Aldol condensation reaction
15. Brief about Bio catalysis.
16. How do you perform Simmson Smith reaction by green synthesis method?
17. Write about bottom-up and top-bottom approach.
18. Explain chemical properties of nonmaterial's.

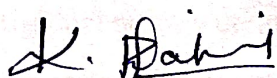
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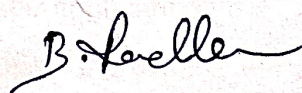
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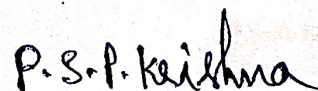
  
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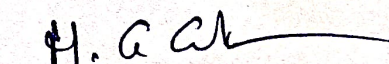
  
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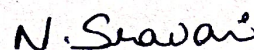


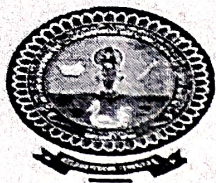
  
B. Jeller

  
(Chairman)

  
(Subject Expert 2)

  
(Alumni)

  
N. Sevari



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**V – SEMESTER**

**Course 14 B: INDUSTRIAL CHEMISTRY- FERTILIZERS AND  
SURFACE COATINGS**

**Credits: 03**

**Learning Outcomes:**

Students after successful completion of the course will be able to:

- 1) Identify the importance of different surface coatings.
- 2) Acquire a critical knowledge on manufacture of ceramics and cement.
- 3) Understand various steps in the manufacture of cane sugar.
- 4) Explain the manufacture of pulp and paper.

**SYLLABUS:**

**UNIT-1: FERTILIZERS**

**9 hours**

A brief introduction to industrial chemistry. Different types of fertilizers. Manufacture of the following fertilizers :Urea, Ammonium nitrate, Calcium ammonium nitrate, Ammonium phosphates; Polyphosphate, Superphosphate, Compound and mixed fertilizers.

**UNIT-2: SILICATES**

**9 hours**

Ceramics: Important clays and Feldspar. Ceramics - types, uses and manufacture. Hightechnology ceramics and their applications.  
Cements: Classification of cement, ingredients and their role, Manufacture of cement and the setting process, quick setting cements.

**UNIT-3 : SURFACE COATINGS**

**9 hours**

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), Water and Oil paints.

**UNIT-4: SUGAR CHEMISTRY**

9 hours

Introduction - Manufacture and Recovery of cane sugar from Molasses, Manufacture of Sucrose from Beet root, testing and estimation of Sucrose.

**UNIT-5: PAPER INDUSTRY**

9 hours

Pulp and Paper-Introduction, Manufacture of pulp, sulphate or Kraft pulp, soda pulp, sulphite pulp, rag pulp, beating, refining, filling, sizing and colouring of pulp, manufacture of paper.

**Suggested Co – Curricular Activities:**


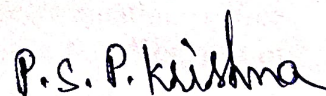
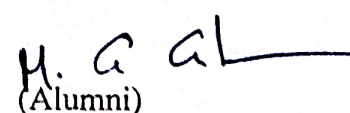
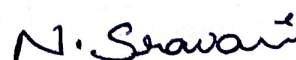
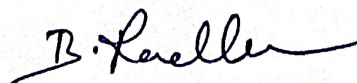
- 1) Training of students by related industrial experts.
- 2) Assignments, Seminars, debates, discussions and Quiz (on related topics).
- 3) Visits to industries, firms, research organizations etc.
- 4) Invited lectures and presentations on related topics by field/industrial experts.
- 5) Preparation of PPTS and videos.

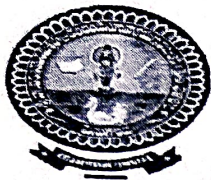
**List of Reference books:**

- 1) J.A.Kent : Riegel's Hand book of Industrial Chemistry, CBS Publishers, New Delhi.
- 2) P.C.Jain, M.Jain : Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
- 3) R. Gopalan, D. Venkappayya, S. Nagarajan: Engineering Chemistry, Vikas Publications, New Delhi.
- 4) B.K.Sharma: Engineering Chemistry, Goel Publishing House, Meerut
- 5) O. P. Vermani, A. K. Narula: Industrial Chemistry, Galgotia Publications Pvt. Ltd., New Delhi.

**APPROVED BY**

(University Nominee)

  
(Subject Expert 1)  
(Academician)  
(Chairman)  
(Subject Expert 2)  
(Alumni)



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**V – SEMESTER**

**Course - 14-B Industrial Chemistry- Fertilizers and  
Surface coatings  
Credits: 01**

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**Learning Outcomes:**

On successful completion of this practical course, student shall be able to:

- 1) Determine free acidity in ammonium sulphate fertilizer.
- 2) Learn the procedure for the Estimation of Calcium in Calcium ammonium nitrate fertilizer.
- 3) Demonstrate skills on Estimation of phosphoric acid in superphosphate fertilizer.
- 4) Acquire skills in using colorimeter for the estimation of sucrose.

**Laboratory course Syllabus:**

- 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) Estimation of sucrose by colorimetry.

**Suggested Co-Curricular Activities:**

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

- 1) For Teacher: Training of students by the teacher in laboratory and field for not less than 15 hours on field related skills in determination of free acidity, estimation of calcium and phosphoric acid in a fertilizer, use of colorimeter to estimate sucrose.
- 2) For Student : Student shall visit a related industry /chemistry laboratory in universities/research organizations/private sector facility and observe the surface coatings of surfaces used to prevent the corrosion. Write their observations and submit a hand written fieldwork/project work report not exceeding 10 pages in the given format to the teacher.
- 3) Max marks for Field work/ project work Report:05.

- 4) For Student :Student shall visit a related industry /chemistry laboratory in universities/research organizations/private sector facility and observe the surface coatings of surfaces used to prevent the corrosion. Write their observations and submit a hand written fieldwork/project work report not exceeding 10 pages in the given format to the teacher.
- 5) Max marks for Field work/ project work Report: 05.
- 6) Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings and acknowledgements.
- 7) Unit tests (IE).

**List of Reference books:**

- 1) Text book of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.
- 2) Text book on Experiments and Calculations in Engineering Chemistry, S.S.Dara,S.Chand.
- 3) R.Gopalan, D.Venkappayya, S.Nagarajan: Engineering Chemistry, Vikas Publications.
- 4) B.K.Sharma: Engineering Chemistry, Goel Publishing House, Meerut

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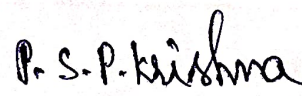
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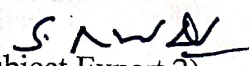
  
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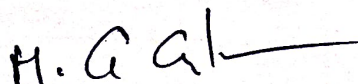
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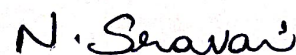
  




  
(Chairman)

  
(Subject Expert 2)

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

**Industrial Chemistry- Fertilizers and  
Surface coating (23CHE53)**

**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	3	Any 4 (4 X 5 = 20 marks)	5	5	30
Unit II	2				
Unit III	1				

**MID Examination II**

Unit	No. of Questions	No. of Questions to be answered	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit III	1	Any 4 (4 X 5 = 20 marks)	5	5	30
Unit IV	2				
Unit V	3				

**APPROVED BY**

(University Nominee)

(Subject Expert 1)

(Academician)

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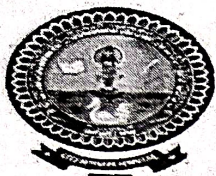
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*P. S. P. Krishna*  
(Chairman)

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(Subject Expert 2)

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(Alumni)

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## INDUSTRIAL CHEMISTRY – FERTILIZERS AND SURFACE COATINGS

(23CHE53)

### 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 brief note on Fertilizers?
2. Explain the Manufacturing of Urea.
3. What is a Ceramic material? Write about the applications of Ceramics.
4. What is the composition of Cement? Explain the role of the ingredients of Cement.
5. Explain the Classification of Surface Coatings.

#### Section-B

6. What are Oil Paints? Explain the Modified Oils?
7. Explain the manufacture of sucrose from beet root
8. Write about the manufacture of sucrose from molasses.
9. Write about the manufacture of Paper.
10. Explain briefly about the process of Kraft pulping.

PART - 2

Answer any five questions. Each question carries 4 marks.

5x4=20 marks


11. Write a short note on Mixed Fertilizers.
12. Explain about Poly Phosphate.
13. Write a brief note on clay.
14. Write a note on Quick Setting Cements.
15. Write a short note on Paints and Pigments.
16. Write a short note on testing of Sucrose.
17. Write a short note on Soda Pulping.
18. What is Rag Pulping

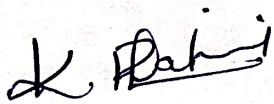
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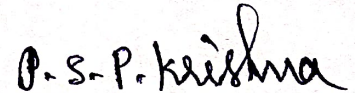
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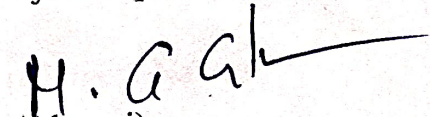
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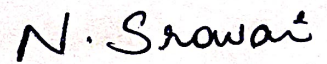


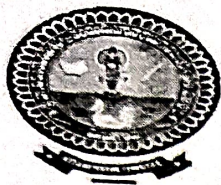


  
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(Subject Expert 2)

  
(Alumni)





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## V - SEMESTER

### Course 15 B : Industrial Chemistry- Polymers and water analysis(Credits: 03)

#### Learning Outcomes:

Students after successful completion of the course will be able to:

- 1) Understand the basic concepts of polymers
- 2) Acquire a critical knowledge on the preparation and applications of organic polymers.
- 3) Explain the sources of air pollution.
- 4) Demonstrate the analysis of water quality parameters.
- 5) Identify the importance of industrial waste management.

#### SYLLABUS:

##### UNIT-1: ORGANIC POLYMERS-1

9 hours

Basic definitions, degree of polymerization, classification of polymers-Natural and Synthetic polymers, Organic and Inorganic polymers, Thermo plastic and Thermosetting polymers, Plastics, Elastomers, Fibers and Resins, Linear, Branched and Cross-Linked polymers.

##### UNIT-2: ORGANIC POLYMERS-2

9 hours

Addition polymers and Condensation polymers, mechanism of polymerization-Free radical, ionic and Zeigler-Natta polymerization. Industrial manufacturing and applications of following polymers, Polystyrene, Poly acrylo nitrile, Poly methacrylate, Polymethyl- methacrylate.

**UNIT-3: AIR POLLUTION****9 hours**

Sources of air pollution, acid rain, photochemical smog, Greenhouse effect, Formation and depletion of ozone, sources and effects of various gaseous pollutants: NO<sub>x</sub>, SO<sub>x</sub>, SPM, CO, hydrocarbons, controlling methods of air pollution.

**UNIT-4 ANALYSIS OF WATER****9hours**

Determination of total hardness of water, Dissolved oxygen, BOD, COD, total dissolved solids, turbidity, alkalinity, determination of chloride using Mohr's method.

**UNIT-5 : INDUSTRIAL WASTE MANAGEMENT****9 hours**

Waste water treatment - primary, secondary & tertiary treatment. (All treatment methods in detail). Characteristics of solid wastes, methods of solid waste treatment and disposal, microbiology involved in solid waste disposal, methods of solid waste disposal-composting, sanitary and filling - economic, aesthetic and environmental problems.

**SUGGESTED CO- CURRICULAR ACTIVITIES**

- 1) Training of students by related industrial experts.
- 2) Assignments, Seminars, discussions and Quiz(on related topics).
- 3) Visits to laboratories, firms, research organizations etc.
- 4) Invited lectures and presentations on related topics by field / industrial experts.

**LIST OF REFERENCE BOOKS :**

- 5) E.Stocchi: Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK
- 6) J.A.Kent : Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
- 7) P.C.Jain, M.Jain : Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
- 8) R. Gopalan, D. Venkappayya, S. Nagarajan: Engineering Chemistry, Vikas Publications, New Delhi.

- 9) B.K.Sharma : Engineering Chemistry, Goel Publishing House, Meerut
- 10) O.P.Vermani, A.K.Narula: Industrial Chemistry, Galgotia Publications Pvt. Ltd., NewDelhi.
- 11) A.K.De, Environmental Chemistry : NewAgeInternational Pvt, Ltd, NewDelhi.
- 12) C.k.Varshney:Water Pollution and Management,Wiley Eastern Limited, Chennai.
- 13) S.S. Dara and D.D. Mishra: Text book of Environmental Chemistry and PollutionControl, Revised edition, S.C.Hand & CoLtd.

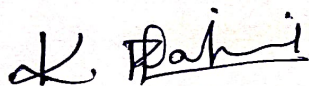
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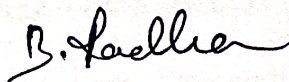
(University Nominee)

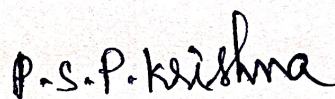
  
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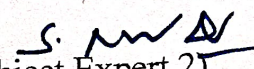
(Academician)

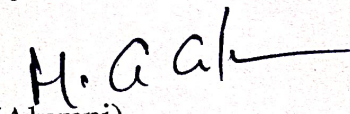


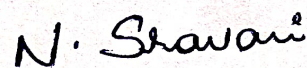




  
(Chairman)

  
(Subject Expert 2)

  
(Alumni)





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### Course – 15- B: INDUSTRIAL CHEMISTRY- POLYMERS AND

#### WATER ANALYSIS(Credits: 01)

#### Learning Outcomes:

On successful completion of this practical course, student shall be able to:

- 1) Learn the procedures for the determination of BOD and COD.
- 2) Demonstrate skills in the determination of chloride in the given water sample.
- 3) Acquire skills in determining the hardness of water.
- 4) Analyse the soil samples
- 5) Handle pHmeter.

#### Laboratory course Syllabus:

- 1) Determination of Hardness of water by EDTA titration.
- 2) Determination of Chemical Oxygen Demand(COD)
- 3) Determination of Biological Oxygen Demand(BOD)
- 4) Determination of chloride using Mohr's method.
- 5) Determination of pH, turbidity and total solids in water sample.
- 6) Determination of  $\text{Ca}^{+2}$  and  $\text{Mg}^{+2}$  in soil sample by flame photometry.
- 7) Determination of pH in soil samples using pHmetry.

#### Suggested Co-curricular activities

Mandatory: (Student training by teacher in field related skills:inlab:15,in field:05hours):

- 1) For Teacher: Training of students by the teacher in laboratory and field for not less than 15 hours on the field related skills in the determination of hardness of water, estimation of COD and BOD in water sample, determination of chloride ion in water sample

2) For Student: Student shall visit a related industry /chemistry laboratory in universities/research organizations /private sector facility and observe the measurement of water quality parameters. Write their observations and submit a hand written field work / project work report not exceeding 10 pages in the given format to the teacher.

- 2) Max marks for Fieldwork/project work Report: 05.
- 3) Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.
- 4) Unit tests (IE).

### List of Reference books :

- 1) Text book of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.
- 2) Text book on Experiments and Calculations in Engineering Chemistry, S.S.Dara, S.Chand.

**Note-1:** For SEMESTER –VII & VIII, for the domain subject Chemistry, Three Core courses and Two Skill Enhanced Courses shall be chosen course A or B from the list of Courses in each SEMESTER. Three pairs of Core Courses are 16A&16B, 17A&17B, 18A&18B for Sem- VII and 21A & 21B, 22 A & 22 B and 23 A & 23 B in Sem-VIII.

Two Pairs of Skill Enhanced Courses are 19A&19B, 20A&20 B for Sem-VII and 24A & 24 B, 25A&25 B from Sem- VIII

One Online Course chosen from Swayam/NPTEL/Any other courses recognized by universities per SEMESTER -VII and VIII.

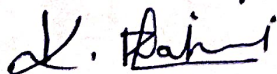
**Note-2:** One of the main objectives of Skill Enhancement Courses (SEC) is to inculcate skills related to the domain subject in students. The syllabus of SEC will be partially skill oriented. Hence, teachers shall also impart practical training to students on the skills embedded in syllabus citing related real field situations.

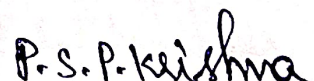
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(Academician)

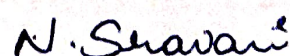


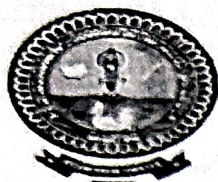
  
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& ISO Certified Institution (with 3 ISO Certificates)  
(Affiliated to ADIKAVI NANNAYA UNIVERSITY - Recognized by Govt. of Andhra Pradesh)  
PENUGONDA - 534320, W.G.DIST.A.P, INDIA  
Phone No: 08819-246126 Email Id:svkp\_penugonda@rediffmail.com Website : svkpandksrajucollege.edu.in

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

**Industrial Chemistry- Polymers and water analysis(23CHE54)**

**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	3				
Unit III	1				

**MID Examination II**

Unit	No.of Questions	No.of Questions to be answered	Co-Curricular Activity	Extra-Curricular Activity	Total Marks
Unit III	1	Any 4 ( 4 X 5 = 20 marks)	5	5	30
Unit IV	2				
Unit V	3				

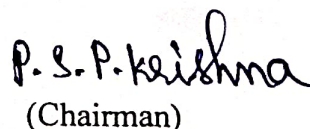
**APPROVED BY**

(University Nominee)

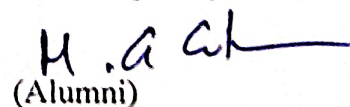
  
(Subject Expert 1)

(Academician)

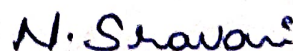


  
(Chairman)

  
(Subject Expert 2)

  
(Alumni)







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## INDUSTRIAL CHEMISTRY- POLYMERS AND WATER ANALYSIS(23CHE54)

### 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. Define Polymer. Write the classification of Polymers?
2. Write a note on i. Resins ii. Fibers and iii. Elastomers?
3. Write a detail note on Addition Polymerization?
4. Write the manufacturing and applications of Polyacrylonitrile (PAN)
5. What is Air Pollution? Explain about Acid Rains and its Effects?

#### Section-B

6. Write about the Formation and Depletion of Ozone layer?
7. Explain the Estimation of Chloride present in Water by Mohr's Method?
8. Write a note on the Parameters of Water?
9. Explain briefly about the Waste water treatment?
10. Explain the methods of Solid waste treatment and disposal?

PART - 2

Answer any five questions. Each question carries 4 marks.


5x4=20 marks

11. Explain Linear and Cross linked Polymers?
12. Write a note on Degree of Polymerisation?.
13. Explain Zigler - Natta Polymerisation?.
14. Write the manufacturing of Polystyrene.
15. Write a short note on Photochemical Smog.
16. Explain the Sources of Air Pollution?
17. Write a brief note on Hardness of Water.
18. Write a note on the Microbiology involving Solid waste disposal?

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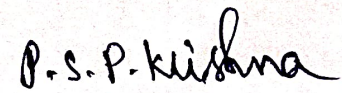
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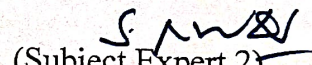
(University Nominee)

  
(Subject Expert 1)

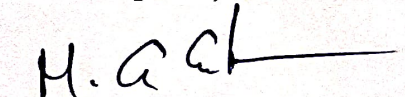
(Academician)



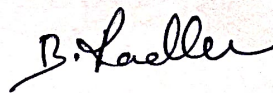
  
(Chairman)

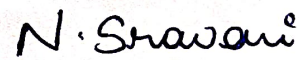
  
(Subject Expert 2)

(Alumni)

  
(Alumni)







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**PENUGONDA-534320, W. G. Dist., A.P.**

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

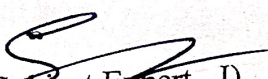
**2025 - 26**



Mr. P. S. Phani Krishna, Chairman, BOS of P G Chemistry requests the Academic Council to consider and approve the Minutes of Board of Studies for the Academic year 2025 - 26 as the Board of Studies meeting was held on 15 - 10 - 2025.

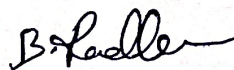
The resolution has been seconded by Dr. M. Sivanadh, Principal, A. G & S. G Siddhartha Degree College of Arts & Science (A), Vuyyuru - 521165 A.P. Subject Expert Board of Studies.

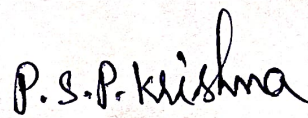
Academic Council is also requested to accord permission to appoint examiners for Theory / Practical for the Academic year 2025 - 26.

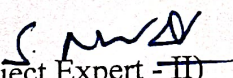
(University Nominee)

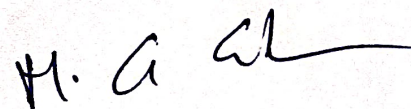
  
(Subject Expert - I)

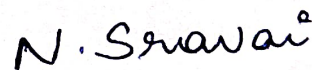
  




  
(Chairman, BOS)

  
(Subject Expert - II)



  
N. Sravani