

Department of studies in Chemistry, Manasagangotri, Mysuru- 570006

**PANEL OF EXAMINERS FOR PG EXAMINATIONS: 2025-26**

List of examiners prepared at the meeting of the Board of Studies in Chemistry (PG) held on 17<sup>th</sup> May 2025 at the Department of Studies in Chemistry, Manasagangotri, Mysuru-570 006.

**INTERNAL EXAMINERS**

Sr. Prof. H. D. Revanasiddappa

**Inorganic Chemistry**

Sr. Prof. K. N. Mohana

**Physical Chemistry**

Prof. M. P. Sadashiva

**Analytical Chemistry**

Prof. B. S. Priya

**Physical Chemistry**

Prof. K. Mantelingu

**Organic Chemistry**

Dr. Basappa

**Organic Chemistry**

**TEMPORARY FACULTY (Consolidated)**

Dr. Sharath Kumar K

**Organic Chemistry**

Dr. Prashanth K N

**Inorganic /Analytical Chemistry**

Dr. Raksha K R

**Analytical Chemistry**

## **LIST OF EXAMINERS**

### **Department of Studies in Chemistry, Manasagangotri, Mysuru-06**

#### **GUEST FACULTY**

- |    |                         |                                 |
|----|-------------------------|---------------------------------|
| 1. | Dr. Syeda Ameera yakuth | Analytical/ Inorganic chemistry |
| 2. | Dr. Saurav Ramesh Nayak | Physical Chemistry              |
| 3. | Dr. Prema M             | Inorganic Chemistry             |

### **Department of Studies in Organic Chemistry, Manasagangotri, Mysore-06**

<b>Sl. No.</b>	<b>Name of the faculty</b>	<b>Specialization</b>
1.	Dr. Gurudatt G. M	Phy/Anal Chemistry
2.	Dr. Swaroop T. R	Organic Chemistry
3.	Dr. Preetham	Organic Chemistry

### **Maharani's Science College for Women, Mysuru and Government FCW, KR Nagar**

<b>Sl. No.</b>	<b>Name of the Faculty</b>	<b>Specialization</b>
1	Dr. Mallikarjun	Physical Chemistry
2	Dr. Pragasam	Inorganic/Anal chemistry
3	Dr. Sadashiva Murthy	Organic chemistry
4	Dr. Ajay kumar B	Inorganic/Anal chemistry
5	Mr. Shivaraju M	Organic/Phy chemistry

### **Yuvaraja's College, University of Mysuru**

<b>Sl. No.</b>	<b>Name of the Faculty</b>	<b>Specialization</b>
1	Dr. K. Ajaykumar	Organic Chemistry
2	Dr. K. B. Umesh	Organic Chemistry
3	Dr. B. S. Sudha	Organic Chemistry
4	Dr. Bibi Ahamadi Katoon	Analytical Chemistry
5	Dr. P. G. Chandrashekara	Inorganic Chemistry
6	Dr. H. P. Jayadevappa	Physical Chemistry
7	Dr. Kumar M. N.	Physical Chemistry
8	Dr. Devaraju	Organic Chemistry

**J. S. S. College, Ooty Road and JSS College for women, Mysore and Sarada Vilas College, Mahajana College/ St. Philomenas College Mysuru**

<b>Sl. No.</b>	<b>Name of the faculty</b>	<b>Specialization</b>
1.	Dr. Rajendra Prasad	Analytical Chemistry
2.	Dr. Mallesh	Inorganic Chemistry
3.	Dr. Mallikarjunaswamy	Physical Chemistry
4.	Dr. Vijayashekar	Inorganic chemistry
5.	Dr. Subramanya Raje Urs	Organic chemistry
6.	Dr. Vinusha H M	Physical Chemistry
7.	Dr. Prakasha G	Inorganic/ Organic chemistry
8.	Dr. Dileepa	Organic chemistry
9.	Dr. Jagadeesha	Anal/Inorganic Chemistry
10.	Dr. Shivakumara	Analytical Chemistry
11.	Dr. Nandini	Physical Chemistry
12.	Dr. Shyla. B	Inorganic Chemistry
13.	Dr. Roopa	Organic chemistry
14.	Dr. Manasa	Anal/Inorganic Chemistry

**Note:** The teachers teaching in the PG Centres with three years of teaching experience are eligible to conduct the practical examinations, and the teachers with more than five years of service are eligible for both theory and practical examinations.

**EXTERNAL EXAMINERS**  
**ANALYTICAL CHEMISTRY**

1. Prof. B. Shyamsundar, Department of Chemistry, Nagarjuna University, Nagarjunanagar – 522 510.
2. Prof. N. Y. Shreedhar, Department of Chemistry, Sri Venkateswara University, Tirupathi – 517 502.
3. Prof. Mohan, Department of Chemistry, Cochin University of Science & Technology, Kochi - 682 022.
4. Prof. A. Varada Reddy, Department of Chemistry, Sri Venkateswara University, Tirupathi – 517 502.
5. Prof. B. Desai, Department of Chemistry, Goa University, Taleigao Plateau, S. P. O. Goa- 403 206.
6. Prof. M. S. Subramanian, Indian Institute of Technology, Chennai – 600 036.
7. Dr. G. K. Nagaraja, Department of Chemistry, Davanagere University, Davanagere – 577007
8. Dr. N. Venkatasubba Naidu, Department of Chemistry, Sri Venkateswara University, Tirupathi – 517 502.
9. Dr. D. Raju, Department of Analytical Chemistry, Madras University, Guindy Campus, Chennai - 600 025.
10. Dr. K. Siddappa, Department of Chemistry, Gulbarga University, Jnanaganga, Gulbarga – 585 106.
11. Prof. Lokesh K.S., Department of Chemistry, VSK University, Ballari.
12. Prof. Nagaswaroop Department of chemistry Davanagere University, Davanagere- 577007

**INORGANIC CHEMISTRY**

13. Dr. K. S. Lokesh, Department of Chemistry, Vijayanagara Sri Krishnadevaraya University, Ballari – 583 104.
14. Prof. Mohan, Department of Chemistry, Cochin University of Science & Technology, Kochi- 682 022.
15. Dr. P. R. Chethana, Department of Chemistry, Bangalore University, Central College, Bengaluru – 560 001.
16. Dr. K. Shivaprasad, Department of Chemistry Amritha Institute of Sciences Mysuru - 570026
17. Prof. K. Siddappa, Department of Chemistry, Gulbarga University, Jnanaganga, Gulbarga – 585 106.

18. Mrs. A. Mary Uma Bala, Andhra University, College of Science & Technology, Vishakhapatnam – 530 003.
19. Prof. Dindi Satyanarayana, Andhra University, College of Science & Technology, Vishakhapatnam – 530 003.
20. Prof. Y. Shivaraj Department of Chemistry, Bangalore University, Jnanabharathi campus, Bengaluru-560056.
21. Dr. Sowbhagya, Department of Chemistry, Bangalore University, Jnanabharathi campus, Bengaluru-560056.
22. Dr. G. K. Nagaraja, Department of Chemistry, Davanagere University, Davanagere – 577007.
23. Dr. Manjanna, Department of Chemistry, Rani Channamma University, Belagavi – 591156.
24. Prof. Ramalingam, Department of Chemistry, Annamalai University, Annamalainagar – 608 002.
25. Dr. Dharmaraja, Department of Chemistry, Bharthiar University, Coimbatore, Tamilnadu – 641 042.
26. Dr. N. Venkatasubba Naidu, Department of Chemistry, Sri Venkateswara University, Tirupathi – 517 502.
27. Dr. G. Krishnamurthy, Department of Chemistry, Sahyadri College, Shivamogga.
28. Dr. K.P Latha Department of Chemistry, Sahyadri College, Shivamogga
29. Dr. Paramesh Naik, Department of Chemistry, Sahyadri College, Kuvempu University Shivamogga.
30. Dr. Jyothi M. V, Department of Chemistry, Sri Venkateswara University, Tirupathi – 517 502.
31. Dr. Arunkumar, Department of Chemistry, Tumkur University, Tumakur.
32. Dr. Nirmala, Department of Chemistry, Tumkur University, Tumakur.
33. Dr. Suresh, Department of Chemistry, Tumkur University, Tumakur.
34. Prof. Sakthivel, Central University of Kerala, Kasargod

### **ORGANIC CHEMISTRY**

35. Prof. S. Hariprasad, Department of Chemistry, Bangalore University, Central College, Bengaluru– 560 001.
36. Dr. Shivashankar, Department of Chemistry, Bangalore University, Central College, Bengaluru-560001
37. Prof. Jaiashankar Department of Chemistry Tumkur University Tumkur
38. Prof. Venkatesh Talwar ,Department of Chemistry Kuvempu University 577451

39. Dr. Shastri, Department of Chemistry, Karnatak University, Dharwad – 580 003.
40. Dr. Ravindra Kambli, Department of Chemistry, Karnatak University, Dharwad – 580 003.
41. Dr. Ananda Sundane, Department of Chemistry, Bharathiar University, Coimbatore, Tamilnadu – 641 042.
42. Prof. P. S. Mohan, Department of Chemistry, Bharathiar University, Coimbatore, Tamilnadu – 641 042.
43. Prof. C. Suresh Reddy, Department of Chemistry, Sri Venkateswara University, Tirupathi – 517 502.
44. Dr. Boja Poojary, Department of Chemistry, Mangalore University, Mangalagangothri – 574 199.
45. Prof. Jagadish Prasad, Department of Chemistry, Mangalore University, Mangalagangothri – 574 199.
46. Prof. K. M. Mahadevan, Department of Chemistry, Kuvempu University, Kadur PG Centre, Kaduru.
47. Prof. Raja Kumar, School of Science, Madras University, Guindy Campus, Chennai - 600 025.
48. Dr. Yadav. D. Bodke, Department of Chemistry, Kuvempu University, Shankarghatta - 577 451.
49. Dr. Padmaja, Department of Chemistry, Sri Venkateswara University, Tirupathi – 517 502.
50. Dr. Baktha Doss, Department of Chemistry, Madras University, Guindy Campus, Chennai - 600 025.
51. Dr. Mohan Krishna, Department of Chemistry, Madras University, Guindy Campus, Chennai - 600 025.
52. Prof. B. P. Bhandagar, Organic Chemistry Research Lab, School of Chemical Sciences, Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra
53. Prof. P. K. Dubey, Department of Chemistry, College of Engineering, J. N. T. University, Kukatpally, Hyderabad – 500 072.
54. Prof. S. P. Kamat, Department of Chemistry, Goa University, Goa – 403 206.
55. Prof. Mohammed Shaffi, Department of Organic Chemistry, Calicut University, Calicut.
56. Dr. B. S. Sreenivas, Department of Chemistry, Tumakur University, Tumkuru.
57. Dr. Sridhar M. V, Department of Chemistry, Ranichannamma University, Belagum.
58. Dr. Basavaraj Padmashali, Department of Chemistry, Ranichannamma University, Belagum.

59. Dr. Kantharaj, Department of Chemistry, Ranichannamma University, Belagum.
60. Dr. Guru Basavaraju, Department of Chemistry, Ranichannamma University, Belagum.
61. Dr. Maddani, Department of Chemistry, Mangalore University, Mangalore.
62. Prof. Sarojini, Department of Industrial Chemistry, Mangalore University, Mangalore.
63. Dr. Ramesh Gani, Department of Industrial Chemistry, Mangalore University, Mangalore.
64. Prof. Krishnasamy, Department of Chemistry, Annamalai University, Annamalai Nagar-608002.
65. Prof. B. P. Nandeshwarappa, Department of Chemistry, Davanagere University, Davanagere
66. Prof. Shivakumar, Central University of Kerala, Kasargod
67. Dr. B. T. Sridhar, Maharani's Cluster University, Bengaluru-560 001

### **PHYSICAL CHEMISTRY**

68. Prof. Mamatha G. P. Department of Chemistry, Davanagere University, Davanagere
69. Prof. Vijaykumar, Department of Chemistry, Tumkur University, Tumkur
70. Prof. M. Gopalakrishnan, Department of Chemistry, Annamalai University, Annamalainagar – 608 002.
71. Dr. Krishnamurthy, Department of Chemistry, Bangalore University, Jnananbharathi Campus, Bengaluru-560056.
72. Dr. Sowbhagya Department of Chemistry, Bangalore University, Jnananbharathi Campus, Bengaluru-560056.
73. Dr. Vishalakshi, Department of Chemistry, Mangalore University, Mangalagangothri – 574 199.
74. Prof. G. K. Raman, Department of Chemistry, Sri Venkateswara University, Tirupathi – 517 502.
75. Prof. M. V. Prabhakara Rao, Department of Chemistry, Sri Venkateswara University, Tirupathi – 517 502.
76. Prof. Ananda Rao, Department of Chemistry, Osmania University, Hyderabad – 500 007.
77. Prof. K. Chandrashekar Pillai, Department of Physical Chemistry, Madras University, Guindy Campus, Chennai - 600 025.

78. Prof. Srinivas Reddy, Department of Chemistry, Sri Venkateswara University, Tirupathi – 517 502.
79. Dr. B. E. Kumaraswamy, Department of Chemistry, Kuvempu University, Shankarghatta - 577 451.
80. Dr. V. Rami Reddy, Department of Chemistry, Sri Venkateswara University, Tirupathi – 517 502.
81. Dr. T. Madhusudhana Reddy, Department of Chemistry, Sri Venkateswara University, Tirupathi – 517 502.
82. Prof. V. Sooryanarayana Rao, Department of Chemistry, Vijayanagara Sri Krishnadevaraya University, Ananthpur – 515 003.
83. Prof. Arthoba Nayak, Department of Chemistry, Kuvempu University, Shankarghatta - 577 451.
84. Prof. M. P. Kannan, Department of Organic Chemistry, Calicut University, Calicut – 673 635.
85. Dr. Chougale, Department of Chemistry, Karnatak University, Dharwad
86. Dr. Lagashetty, Department of Chemistry, VSK University, Ballari.
87. DR. M.K.Amshumali, Department of Chemistry, VSK University, Ballari.
88. Dr. Vidyasagar, Department of Chemistry, RCU, Belagavi
89. Dr. I. Puspavathi, Department of Industrial Chemistry, Kuvempu University, Shankarghatta
90. Dr. Sadu Suryakanth, Department of Chemistry, VSK University, Ballari.
91. Dr. T. Ramesh, Department of Chemistry, Tumkur University, Tumkur



**University of Mysore**  
**Department of Studies in Chemistry, manasagangotri, Mysuru-06**

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**Date: 17-05-2025**

**Proceedings of the BOS meeting held on 17-05-2025 in DOS in Chemistry, MGM**

The meeting of the Board of Studies (CB) in Chemistry, University of Mysore was held on Saturday, the 17<sup>th</sup> May 2025 at 11.00am in the chamber of Chairman, Board of Studies in Chemistry, DOS in Chemistry, Manasagangotri, Mysuru.

Chairman, BOS in Chemistry, welcomed the members for the meeting and briefed the agenda of the meeting.

**Agenda:**

1. Framing of 2nd year/3rd and 4th semesters B. Sc syllabus (As per University order)
2. Any modifications in the M. Sc syllabus under choice based credit system (CBCS).
3. Revision of Panel of examiners for UG and PG programs
4. Any other matter.

**Decision:**

**Agenda 1:**

After elaborate discussion on the agenda placed for the meeting, the Board of Studies in Chemistry (CB) draws the following decisions.

1. Resolved to verified and approved the syllabus for III and IV semesters B. Sc program as per the curriculum and credit framework for undergraduate program (UOM Order No. AC2(S)/07/2024 dated 29/04/2025).
2. The board framed and approved the Scheme of Examination and theory question papers model for III and IV semesters B. Sc program.
3. The board framed and approved Scheme of Examination (practical papers) for III and IV semesters B. Sc program.

**Agenda 2:**


Resolved to retain the existing syllabus for M. Sc Chemistry program for the academic year 2025-26

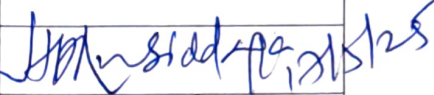


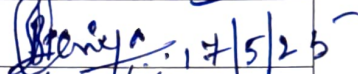


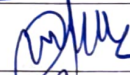
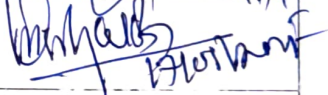

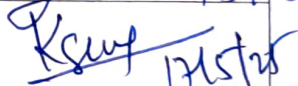
**Agenda 3:**

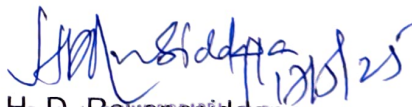
The board prepared and approved the Panel of Examiners for UG program for the academic year 2025-26. And, also approved the Panel of Examiners for M. Sc Chemistry (PG) program for the academic year 2025-26.

**Agenda 4: -Nil**

The meeting was concluded by thanking all the members.

  
Dr. P. D. REVANASIDDAPPA, Ph.D.  
Professor  
Department of Chemistry  
University of Mysore  
Manasagangotri  
Mysore - 570 006, INDIA.

Sl. No.	Members	Signature
1.	Prof. H. D. Revanasiddappa, Chairman, BOS in Chemistry, Manasagangotri, Mysuru	
2.	Prof. K. N. Mohana, DOS in Chemistry, Manasagangotri, Mysuru.	 17/5/25
3.	Prof. M. P. Sadashiva, DOS in Chemistry, Manasagangotri, Mysuru.	
4.	Prof. B. S. Priya, DOS in Chemistry, Manasagangotri, Mysuru.	 17/5/25
5.	Prof. K. Mantelingu, DOS in Chemistry, Manasagangotri, Mysuru.	 17/05/25
6.	Prof. K. Ajay Kumar, Department of Chemistry, Yuvaraja College, Mysuru.	 17/05/25
7.	Prof. B. M. Venkatesha, Department of Chemistry, Yuvaraja College, Mysuru (Special invitee).	 17/5/25
8.	Prof. K. B. Umesh, Department of Chemistry, Yuvaraja's College, Mysuru. (Special invitee )	 17/5/25
9.	Prof. P. G. Chandrashekara, Department of Chemistry, Yuvaraja's College, Mysuru (Special invitee).	 17/5/25
10.	Prof. B. K. Kendagannaswamy, Department of Chemistry, JSS College, Nanjanagud (Special invitee )	 17/5/25
11.	Prof. K. S. Lokesh, DoS in Chemistry, Vijayanagara Sri Krishnadevaraya University, Bellary-583104. <b>External Member</b>	- Absent -

  
 Prof. H. D. Revanasiddappa  
 Professor  
 Chairman, BOS in Chemistry (CB)  
 University of Mysore  
 Manasagangotri  
 Mysore - 570 006, INDIA.

**UNIVERSITY**



**OF MYSORE**

**SYLLABUS (CBCS Scheme)**

**CHEMISTRY**

**(III and IV SEMESTERS)**

**FOR B.Sc. DEGREE PROGRAMME**

**2024-25 (Batch Onwards)**

**B.Sc. CHEMISTRY SYLLABUS****THIRD SEMESTER****Paper: Chemistry-III****Code: CHSDSC-III**

Contact Hours/Week	Credits	Scheme of Evaluation: Max. Marks: 100		
		Continuous Internal Assessment (CIA)		Semester End Examination (SEE)
		C1	C2	C3
03	03	10 Marks	10 Marks	80 Marks

**PAPER: Chemistry-III****[45 Hours]****UNIT-I: Inorganic Chemistry****[15 Hrs]****p- Block Elements**

**Boron:** Boron hydrides – Classification with examples. Diborane- preparation, structure and nature of bonding.

**Interhalogen compounds:** Definition, types with examples, general methods of preparation (by direct combination of halogen, from lower inter halogens) and properties (physical state, thermal stability, reactivity, and hydrolysis), Applications.

**Noble gases:** Chemical properties and applications of noble gases, chemistry of xenon, preparation, and structure of xenon compounds ( $\text{XeF}_2$ ,  $\text{XeF}_4$ ,  $\text{XeF}_6$ ,  $\text{XeO}_3$  and  $\text{XeO}_4$ ). **[06 Hrs]**

**Chemistry of transition elements:** Position in the periodic table, general characteristics, electronic configuration, atomic and ionic radii, ionization energy, variable oxidation states, spectral properties, redox potentials, colour and magnetic properties, catalytic activity and complex formation. **[05 Hrs]**

**Chemistry of Lanthanides and Actinides:** Electronic configuration, oxidation states, colour, spectral, magnetic properties, catalytic activity and complex formation. Lanthanide contraction- Causes and consequences. Separation of lanthanides by ion-exchange method

General features and chemistry of Actinides, principles of separation of Neptunium, and Plutonium from uranium. Trans-uranium elements **[04 Hrs]**

**UNIT-II: Organic Chemistry****[15 Hrs]**

**Alcohols:** Definition and classification. **Monohydric alcohols:** Preparation of alcohols by Hydroboration-oxidation method. Hydration of alkenes. Distinction tests between  $1^\circ$ ,  $2^\circ$ , and  $3^\circ$  alcohols by Victor Meyer and oxidation method. Conversion of  $1^\circ$  to  $2^\circ$ ,  $2^\circ$  to  $3^\circ$  and  $1^\circ$  to  $3^\circ$  alcohols. Dehydration of  $1^\circ$ ,  $2^\circ$ ,  $3^\circ$  alcohols and comparison of their rates. **Dihydric alcohols:** Glycol – preparation from vicinal dihalides and uses. Pinacols – synthesis, mechanism of pinacol-pinacolone rearrangement. **Trihydric alcohols:** Glycerol, synthesis from propene, reactions with  $\text{HNO}_3$ ,  $\text{H}_2\text{SO}_4$ , oxalic acid and HI. Uses of glycerol. **[05 Hrs]**

**Phenols:** Definition, classification with examples, acidity of phenols, effect of substituents on acidity of phenols. Mechanism of Reimer-Tiemann reaction and Kolbe reaction. Fries and Claisen rearrangement with examples. Conversion of phenol to phenolphthalein. [04 Hrs]

**Ethers:** Nomenclature, Williamson ether synthesis, reactions – cleavage and auto-oxidation-Ziesel's method (estimation of  $-\text{OCH}_3$ ). **Crown ethers:** Introduction with examples, application as phase transfer catalysts. [02 Hrs]

**Carbonyl Compounds:** Nomenclature, synthesis of aldehydes and ketones from alcohols. Distinction between aldehydes and ketones – oxidation and reduction method. Addition of alcohols- formation of hemiacetal and acetal. Condensation with  $\text{NH}_2\text{OH}$  and 2,4-DNP. Mechanism of aldol condensation, Perkins reaction, Cannizzaro reaction, Wolf-Kishner and Clemmensen reduction. [04 Hrs]

### UNIT-III: Physical Chemistry

[15 Hrs]

#### Thermodynamics

First law of thermodynamics: Statement and mathematical equation.

**Second law of thermodynamics:** Spontaneous and non-spontaneous processes– definition and examples. Definition and significances of entropy, variation of entropy with P, T and V (derivation). Criteria of spontaneity in terms of entropy change. Heat engine – Carnot cycle and efficiency of heat engine (derivation). Carnot's theorem and thermodynamic scale of temperature. Different statements of second law of thermodynamics (Numerical problems)

**Free energy**-Helmholtz and Gibb's free energy, Gibb's-Helmholtz equation at constant pressure and constant volume (derivation), thermodynamic criteria for spontaneity in terms of A and G. Variations of Helmholtz free energy with V and T, Variation of Gibb's free energy with P and T (derivation). Clausius-Clapeyron equation with differential form (derivation) and its applications in liquid-vapor equilibrium. Vant-Hoff's reaction isotherm-derivation and its applications. Nernst heat theorem and third law of thermodynamics. Calculation of absolute entropy of water (Problems).

**Partial molar quantities:** Introduction, partial molar volume and partial molar free energy (chemical potential)-definition and formulation of Gibb's-Duhem equation. [10 Hrs]

**Phase equilibria:** Definition of the terms- Phase, component and degree of freedom with examples. Statement of Gibb's phase rule and thermodynamic derivation. Applications- (a) one component system-water system (b) reduced phase rule and reduced system, two component system- Silver-lead system (eutectic type), desilverization of lead and  $\text{FeCl}_3\text{-H}_2\text{O}$  system (congruent melting point).

**Freezing mixtures:** Definition and examples, Explanation based on KI-water system. [05 Hrs]

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**PRACTICALS****Paper: Chemistry Practical-III****Code: CHSDSCP-III**

Contact Hours/Week	Credits	Scheme of Evaluation: Max. Marks: 50		
		Continuous Internal Assessment (CIA)		Semester End Examination (SEE)
		C1	C2	C3
04	02	05 Marks	05 Marks	40 Marks

**LIST OF EXPERIMENTS****PART-A: Semimicro Qualitative Analysis of Inorganic Salt Mixtures**

Systematic semimicro qualitative analysis of two anions and two cations in a given salt mixture.

The constituent ions in the mixture to be restricted to the following.

**Anions:**  $\text{HCO}_3^-$ ,  $\text{CO}_3^{2-}$ ,  $\text{S}^{2-}$ ,  $\text{SO}_3^{2-}$ ,  $\text{NO}_2^-$ ,  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{I}^-$ ,  $\text{NO}_3^-$ ,  $\text{BO}_3^{3-}$ ,  $\text{PO}_4^{3-}$  and  $\text{SO}_4^{2-}$ .

**Cations:**  $\text{Pb}^{2+}$ ,  $\text{Bi}^{3+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Cd}^{2+}$ ,  $\text{Al}^{3+}$ ,  $\text{Fe}^{2+}$ ,  $\text{Fe}^{3+}$ ,  $\text{Mn}^{2+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Co}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Ba}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{K}^+$ ,  $\text{Na}^+$  and  $\text{NH}_4^+$ .

Spot tests should be carried out wherever feasible

The students are required to write any two ionic reactions for both anions and cations given.

**PART-B: Preparation of Coordination Compounds**

1. Preparation of hexamminenickel(III)chloride.
2. Preparation of potassiumtris(oxalato)ferrate(III) and estimate the iron
3. Preparation of ammonium copper(II) sulphate tetrahydrate.
4. Preparation of potassium trisoxalatoaluminate(III) trihydrate.
5. Preparation of mercury tetra thiocyanatocobaltate(II). (Demonstration)

\*\_\*\*\_\*\*\_\*\*\_\*\*\_\*\*\_\*

**ELECTIVE PAPER****Paper: Chemistry Elective-I****Code: CHSEC-I**

Contact Hours/Week	Credits	Scheme of Evaluation: Max. Marks: 100		
		Continuous Internal Assessment (CIA)		Semester End Examination (SEE)
		C1	C2	C3
03	03	10 Marks	10 Marks	80 Marks

**PAPER: Chemistry Elective-I****[45 Hours]****UNIT-I: Industrial chemistry****[15 Hrs]**

**Fuels:** Definition, classification with examples, characteristics, calorific value, determination of calorific value of a solid or liquid fuel (bomb calorimetric method). Applications of gaseous fuels. Comparison between solid, liquid and gaseous fuels. Compressed natural gas, water gas, producer gas and LPG – their production, composition, and applications. **Explosives:** Definition, classification with examples, characteristics of explosives. Preparation and uses of dynamite, cordite and RDX.



**Lubricants:** Classification of lubricants, lubricating oils (conducting and non-conducting) Solid and semisolid lubricants, synthetic lubricants. Properties of lubricants (viscosity index, cloud point, pore point) and their determination. [08 Hrs]

**Fertilizers:** Economic importance, synthesis of nitrogenous fertilizers- CAN, ammonium sulfate, ammonium nitrate and urea. Phosphate fertilizers-calcium dihydrogen phosphate, super phosphate.

**Abrasives:** Definition, classification with examples – hardness, manufacture and applications of carborundum, alundum and tungsten carbide. **Refractories:** Definition, properties, classification with examples. Different steps involved in the manufacture of refractories. Applications of refractories.

**Ceramics:** Introduction, types, manufacturing process, applications. **Glasses:** Introduction, types and compositions with examples and uses. [07 Hrs]

## UNIT-II: Organic chemistry

[15 Hrs]

**Drugs:** Definition, chemotherapy and chemotherapeutic agents, types of drugs, antipyretics, analgesics, anaesthetics, antiseptics, antibacterial, antibiotics, antimalarial and sulpha drugs with examples. Synthesis and uses of aspirin, paracetamol, and sulphaguanidine. **Antibiotics:** Structure and mode of action of penicillin-G, chloramphenicol. **Antimalarial:** Structure and mode of action of Chloroquine. **Anticancer/antiviral:** Structure and mode of action of 5-fluorouracil. [07 Hrs]

**Pesticides** -General introduction to pesticides (natural and synthetic), benefits and adverse effects, changing concepts of pesticides, structure activity relationship, synthesis and technical manufacture and uses of representative pesticides in the following classes: Organochlorines (DDT, Gammaxene); Organophosphates (Malathion, Parathion); Carbamates (Carbofuran and carbaryl); Quinones (Chloranil), Anilides (Alachlor and Butachlor).

**Dyes:** Introduction, colour and constitution, chromophore-auxochrome theory. Chemical methods of classification of dyes with examples, synthesis and uses of malachite green, indigo, alizarin and methyl orange. [08 Hrs]

## UNIT-III: Physical Chemistry

[15 Hrs]

**Radiation Chemistry:** Definition, primary and secondary stages in radiochemical process, G- value, LET of radiation, radiation chemistry comparison with photochemistry. Units of radiation - rad, gray, Roentgen. Chemical dosimeters- Frick-dosimeter, Ceric sulphate dosimeter. Theories of radiolysis – Lind's and EHT theories. Radiolysis of water, cysteine and acetic acid. [5 Hrs]

**Polymers:** Introduction, monomer, repeating units, types (linear, branched and network) with examples, degree of polymerization, Classification: Addition polymerization (free radical, ionic Ziegler-Natta polymerization), Condensation polymerization (polyesters, polyamides, and Urea-formaldehyde resins). Molar masses of polymers –number average and mass average, determination of molar mass by viscosity and osmotic pressure method. Applications of polymers as plastics in

electronic, automobile components, medical fields, and aerospace materials. Problems of plastic waste management. **[06 Hrs]**

**Elementary Quantum Chemistry:** Black body radiation, plank's radiation law, Rayleigh-Jeans law, photo electric effect, and Compton effect (Explanation with mathematical equations). Heisenberg uncertainty principles. Operators – Linear, non-linear, Laplacian, Hermitian and Hamiltonian operators. Postulates of quantum mechanics, Schrodinger wave equation (explanation with mathematical expression) and its importance, wave function, physical significance of wave function. SWE for particle in one- dimensional box (Numerical problems). **[04 Hrs]**

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## FOURTH SEMESTER

**Paper: Chemistry-IV**

**Code: CHSDSC-IV**

Contact Hours/Week	Credits	Scheme of Evaluation: Max. Marks: 100		
		Continuous Internal Assessment (CIA)		Semester End Examination (SEE)
		C1	C2	C3
03	03	10 Marks	10 Marks	80 Marks

**PAPER: Chemistry-IV**

**[45 Hours]**

**UNIT-I: Inorganic Chemistry**

**[15 Hrs]**

**Nuclear chemistry:** Fundamental particles of nucleus, nucleons. Isotopes, isobars and isotones (definition with suitable examples), Nuclear forces (brief explanation), nuclear stability-n/p ratio, mass defect, packing fraction, binding energy, nuclear fission- (definition with suitable examples), calculation of energy release in nuclear fission, modes of release of fission energy (uncontrolled and controlled). Nuclear reactor–Principal components, types of reactors. Nuclear fusion and its advantages over nuclear fission reactions, hydrogen bomb, Q values of nuclear reactions (Numerical problems). **[05**

**Hrs]**

**Indicators:** Definition, types (acid-base, redox, adsorption indicators and universal indicators) with examples. Theory of indicator- Ostwald's theory and quinonoid theory, indicator constant. Action of phenolphthalein and methyl orange in acid-base solution, colour change and pH range. pH titration curves for strong acid versus strong base, weak acid versus strong base and strong acid versus weak base, choice of indicators in these types of titrations. **[04 Hrs]**

**Organic reagents in inorganic analysis:** Advantages of organic precipitants over inorganic reagents, structures and uses of EDTA in the volumetric estimations of Mg, Ca and Zn. Oxine in the gravimetric



estimation of Mg. DMG in the gravimetric estimation of Ni. 1,10-phenanthroline in the colorimetric estimation of iron. [03 Hrs]

**Gravimetry:** Introduction to gravimetric analysis – precipitation methods (various steps involved to be discussed), advantages of gravimetric analysis, purity of the precipitates, co-precipitation and post-precipitation, conditions of precipitation, nucleation, crystal growth, digestion. Precipitation from homogeneous solution (hydroxides and sulphates), washing and ignition of precipitate (general discussion only). [03 Hrs]

## UNIT-II: Organic Chemistry

[15 Hrs]

**Carboxylic acids:** Definition, classification with examples. Synthesis by Arndt-Eistert reaction, resonance structure of carboxylate ion and its stability. Effect of substituents on acidity of aliphatic and aromatic carboxylic acids. **Hydroxy acids:** Synthesis of lactic, citric, and tartaric acids. Effect of heat on  $\alpha$ ,  $\beta$ ,  $\gamma$ -hydroxy acids. [03 Hrs]

**Amines:** Definition, classification with example. Separation of amine mixture by Hinsberg's method using toluene sulphonyl chloride. Distinction tests for  $1^\circ$ ,  $2^\circ$ ,  $3^\circ$  amines (acetylation and Hoffmann's exhaustive methylation. Action of nitric acid on different amines. Both aliphatic and aromatic  $1^\circ$ ,  $2^\circ$ ,  $3^\circ$  amines, basicity of amines, effect of substituents on basicity of aliphatic and aromatic amines. Hoffmann-Martius rearrangement. **Diazonium Compounds:** preparation, mechanism of preparation and synthetic applications of benzene diazonium chloride. Conversion to phenol, halobenzene, phenyl hydrazine and coupling reaction. [05 Hrs]

**Stereochemistry:** Introduction, definition, elements of symmetry (plane, centre and alternative axes), asymmetry and dissymmetry, Chirality, designation of configuration (D-L and R-S). Optical activity – explanation – cause of optical activity (non-super impossibility). Enantiomers and diastereomers optical isomerism in tartaric acid and biphenyl compounds, racemisation, resolution, methods of resolution (Chemical and biochemical methods) Walden inversion, asymmetric synthesis (partial and absolute). **Geometrical isomerism:** Definition with example, designation of cis-trans and E-Z notations with examples. Characteristics and identification of geometrical isomers. Geometrical isomerism in aldoximes and ketoximes, Beckmann rearrangement with mechanism. [07 Hrs]

## UNIT-III: Physical Chemistry

[15 Hrs]

**Chemical Kinetics:** Molecularity, order, rate and rate constant of reactions (definitions). Zero order reaction (statement and rate equation). Differential and integrated rate equations for second order kinetics, derivation of second order rate equation when  $a = b$ . and  $a \neq b$ , unit of  $2^{\text{nd}}$  order rate constant, half-life period. Determination of the order of the reaction-differential and time for half change method. Effect of temperature on rate of reaction. Temperature coefficient, Arrhenius equation, concept of activation energy-determination using Arrhenius equation and graphical method. Theories

of reaction rate: derivation of rate constants from-(i) simple collision theory, (ii) transition state theory (using classical thermodynamics). Problems on half-life period and energy of activation. Experimental methods for the study of chemical kinetics: Conductometric (saponification of esters) and spectrophotometric (kinetics of oxidation of Indigo carmine by chloramine-T). **[09 Hrs]**

**Spectrophotometry and Photochemistry:** Lambert-Beer's law: Statement and mathematical equation to be derived (problems). Molar extinction coefficient-definition and its determination (graphical method), limitations of Beer's law. Spectrophotometer: Construction and working. Applications of spectrophotometry (mention only).

**Photochemistry:** Grothus-Draper's law, Stark-Einstein law of photochemical equivalence. Quantum efficiency: definition, reasons for low quantum yield and high quantum yield with examples (photochemical formation of HBr and HCl). Uranyl oxalate actinometer (Problems).

**Photophysical processes:** photosensitization (taking mercury as an example), photoinhibition, fluorescence and phosphorescence Chemiluminescence and bioluminescence (explanation with examples), mechanism (qualitative). **[06 Hrs]**

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## PRACTICALS

**Paper: Chemistry Practical-IV**

**Code: CHSDSCP-IV**

Contact Hours/Week	Credits	Scheme of Evaluation: Max. Marks: 50		
		Continuous Internal Assessment (CIA)		Semester End Examination (SEE)
		C1	C2	C3
04	02	05 Marks	05 Marks	40 Marks

## LIST OF EXPERIMENTS

## PART-A: Physical Chemistry (Non-Instrumental) Experiments

1. Determination of the density of liquid using specific gravity bottle and its viscosity using Ostwald's Viscometer [Carbon tetrachloride, ethyl acetate, water, 1% NaCl solution].
2. Determination of the density of liquid using specific gravity bottle and its surface tension using Stalagmometer [ Carbon tetrachloride, ethyl acetate, water, 1% NaCl solution].
3. Determination of molecular mass of a non-volatile solute by Walker-Lumsden method [Urea, NaCl, KCl].
4. Determination of rate constant of the decomposition of hydrogen peroxide catalysed by  $\text{FeCl}_3$ .
5. Determination of transition temperature of the salt hydrates [sodium thiosulphate, strontium chloride].
6. Determination of rate constant of saponification of ethyl acetate by titrimetry.
7. Determination of percentage composition of sodium chloride by miscibility temperature method [phenol-water system].
8. Determination of first order rate constant of acid hydrolysis of ethyl acetate.

- Thermometric titration of a strong acid against strong base.
- Determination of heat of neutralization of strong acid and strong base.

**PART-B: Ore/synthetic mixture analysis**

- Determination of iron in the given sample of hematite using potassium dichromate.
- Estimation of manganese in the given sample of pyrolusite.
- Estimation of calcium and magnesium in the given sample of dolomite by EDTA method.

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**SKILL BASED COURSE (ELECTIVE - COMPULSORY)****Paper: Chemistry Skill Practical****Code: CHSSBC-I**

Contact Hours/Week	Credits	Scheme of Evaluation: Max. Marks: 50		
		Continuous Internal Assessment (CIA)		Semester End Examination (SEE)
		C1	C2	C3
04	02	05 Marks	05 Marks	40 Marks

**LIST OF EXPERIMENTS****PART-A:**

- Determination of total acidity of vinegar/waste water by acid-base titration.
- Spectrophotometric determination of creatinine in urine.
- Determination of aspirin in their tablet preparations by acid-base titrimetry.
- Determination of purity of a commercial sample of boric acid.
- Determination of calcium in pharmaceuticals by EDTA titration.
- Determination of iron in pharmaceuticals by visual and potentiometric titrations.
- Food adulteration: Determination of adulteration in food stuffs (Demonstration).
- Analysis of cement (Demonstration).
- Determination of nitrite-Nitrogen in fertilizers by spectrophotometry.

**PART-B****ORGANIC ESTIMATIONS**

- Estimation of aspirin by colorimetric method.
- Estimation of vitamin-C by iodometric method.
- Estimation of paracetamol by titrimetric method
- Estimation of acetone by haloform method
- Estimation of glucose (sugar) by colorimetric method

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**ELECTIVE PAPER****Paper: Chemistry Elective-II****Code: CHSEC-II**

Contact Hours/Week	Credits	Scheme of Evaluation: Max. Marks: 100		
		Continuous Internal Assessment (CIA)		Semester End Examination (SEE)
		C1	C2	C3
03	03	10 Marks	10 Marks	80 Marks

**UNIT-I: Inorganic Chemistry****[15 Hrs]**

**Inorganic polymers:** Definition – examples, general properties, comparison with organic polymers, glass transition temperature. **Silicones:** Definition, nomenclature, preparation (linear, cross-linked and cyclic). Factors affecting the nature of silicon polymers, properties (chemical and thermal stabilities, chemical properties) uses of silicon polymers, silicon fluids/oils–uses, silicon elastomers – rubbers, silicon resins (preparation and uses). **Phosphazenes:** Definition, types, preparation, structures, properties, nature of bonding and uses. Crystalline polymetaphosphates – Maddrell’s and Kuroll’s salts, properties and uses and sulfur-nitrogen compounds.

**[08 Hrs]**

**Silicates:** Structure, classification - silicates with discrete anions, silicates containing chain anion, silicates with layer structure, silicones with three dimensional net-work and applications.

**Inorganic fibers:** Introduction, properties, classification, asbestos fibers, optical fibers, carbon fibers and applications.

**Zeolites:** Introduction, types of zeolites, manufacture of synthetic zeolites and applications.

**Inorganic pigments:** General information and economic importance. **White pigments:** Titanium dioxide and zinc oxide pigments. **Color pigments:** Iron oxide, chromium oxide, mixed metal oxide pigments and ceramic colorants, corrosion protection pigments, luster pigments, luminescent pigments and magnetic pigments

**[07 Hrs]****UNIT-II: Organic Chemistry****[15 Hrs]**

**Petroleum and Petrochemical Industry:** Composition of crude petroleum, Refining and different types of petroleum products and their applications. Fractional Distillation (Principle and process), Cracking (Thermal and catalytic cracking), Reforming Petroleum and non-petroleum fuels (LPG, CNG, LNG, bio-gas, fuels derived from biomass), fuel from waste, synthetic fuels (gaseous and liquids), clean fuels. **Petrochemicals:** Vinyl acetate, Propylene oxide, Isoprene, Butadiene, Toluene and its derivatives -Xylene.

**[07 Hrs]**

**Concept of Energy in Biosystems:** Calorific value of food. Standard caloric content of carbohydrates, proteins and fats. Oxidation of foodstuff (organic molecules) as a source of energy for cells. Introduction to Metabolism (catabolism, anabolism).

**Nucleic Acids:** Components of nucleic acids: Adenine, guanine, thymine and cytosine (Structure only), other components of nucleic acids, Nucleosides and nucleotides (nomenclature), Structure of polynucleotides; Structure of DNA (Watson-Crick model) and RNA (types of RNA), Genetic Code, Biological roles of DNA and RNA: Replication, Transcription and Translation. [08 Hrs]

**UNIT-III: Physical Chemistry [15 Hrs]**

**Batteries:** Classification, characteristics, primary, secondary batteries. Working of the following batteries- Lead acid and Lithium batteries, Fuel cells. Energetics of cell reactions: Effect of temperature, pressure, and concentration on energetics of cell reactions (calculation of  $\Delta G$ ,  $\Delta H$  and  $\Delta S$ ).

**Corrosion:** Introduction, definition, types of corrosion, electrochemical theory of corrosion. Thermodynamic aspects of corrosion. Corrosion rate, factors affecting corrosion rate- metal and environmental factors-temperature, pH of the medium, humidity, presence of impurities electrical conductivity of the medium, concentration of the medium. Even diagrams in corrosion cells. [08 Hrs]

Prevention of corrosion- designing aspects, effect of alloying and surface coating, painting, phosphating, and anodic protection (passivation) cathodic protection. Corrosion inhibitors. Introduction, classification, characteristics and requirements of efficient corrosion inhibitors and their significance, corrosion inhibition mechanism.

**Electroplating:** Introduction, electroplating of chromium (hard and decorative).

**Electro less plating:** Introduction, distinction between electroplating and electroless plating process, Electroless plating of copper. [07 Hrs]

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## SCHEME OF EXAMINATION

### QUESTION PAPER: THEORY EXAMINATION

(Applicable to **DSC-3, DSC-4, Elective-I and II**)

**Time: 03 Hours**

**Max. Marks: 80**

**Instructions:** Draw a neat labelled diagrams wherever necessary.

#### PART-A

Answer all of the following

8 X 1 = 08

- 1 a)
- b)
- c)
- d)
- e)
- f)
- g)
- h)

#### PART-B: Inorganic Chemistry

Answer any three of the following

3 X 8 = 24

- 2
- 3
- 4
- 5

#### PART-C: Organic Chemistry

Answer any three of the following

3 X 8 = 24

- 6
- 7
- 8
- 9

#### PART-D: Physical Chemistry

Answer any three of the following

3 X 8 = 24

- 10
- 11
- 12
- 13

The sub-questions in Q2-Q13 shall be of (3+3+2) or (5+3) or (4+4) Marks

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**DSCP-III: CHEMISTRY-III (PRACTICALS)****Time: 03 Hours****Max. Marks: 40****Note:** Duly certified practical record shall be submitted for evaluation at the examination.**Distribution of Marks**

Record	5 Marks
Part A	25 Marks
Part B	10 Marks

**PART A****Q.No.1: Systematic semimicro qualitative analysis of inorganic salt mixtures**

(two anions and two cations).

**25 Marks**

Two anions and two cations should be given from the following constituent ions.

**Anions:**  $\text{HCO}_3^-$ ,  $\text{CO}_3^{2-}$ ,  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{NO}_3^-$ ,  $\text{BO}_3^{3-}$  and  $\text{SO}_4^{2-}$ .**Cations:**  $\text{Pb}^{2+}$ ,  $\text{Bi}^{3+}$ ,  $\text{Al}^{3+}$ ,  $\text{Mn}^{2+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Ba}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{K}^+$ ,  $\text{Na}^+$  and  $\text{NH}_4^+$ .**Note:** 1. Mixtures requiring elimination of phosphate and borate anions should not be given (avoid cations like  $\text{Mn}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Sr}^{2+}$  and  $\text{Ba}^{2+}$  when borate is given).

2. Two anions from the same group should not be given.

3. Salts that yield  $\text{SrSO}_4$ ,  $\text{BaSO}_4$ ,  $\text{CaSO}_4$  and  $\text{PbSO}_4$  on double decomposition shall be avoided.4. Two cations from the same group should not be given. However, combinations like  $\text{Mg}^{2+}/\text{NH}_4^+$ ,  $\text{K}^+/\text{NH}_4^+$  and  $\text{Na}^+/\text{NH}_4^+$  shall be given.5.  $\text{NH}_4^+$  radical may be analyzed and reported in the beginning of detection of cations (ammonium radical shall be considered in the zero group).**DISTRIBUTION OF MARKS**

Preliminary Test	Physical state, colour, litmus paper test and solubility test	03 Marks
Detection of anions	Confirmation of two anions with all tes	08 Marks
	Confirmation of one anion with all tests	04 Marks
	Identification of group only	01 Mark
Detection of cations	Group separation table for cations (w.r.t presence of given cations)	02 Marks
	Confirmation of two cations with all tests	08 Marks
	Confirmation of one cation with all tests	04 Marks
Balanced chemical/ionic equation for confirmatory tests	Confirmatory test of any ONE anion given	02 Marks
	Confirmatory test of any ONE cation given	02 Marks

**PART B****Q.No.2: Procedure writing for any one of the following.****10 Marks**

1. Preparation of mercury tetrathiocyanatocobaltate(II).
2. Preparation of tetraammonium copper(II) sulphate.
3. Preparation of potassium trisoxalatoaluminate(III).
4. Preparation of trithiourea copper(I) chloride.

**DISTRIBUTION OF MARKS**

Reaction equation	03 Marks
Calculation of theoretical Yield	02 Marks
Procedure writing	05 Marks

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**DSCP-IV: CHEMISTRY-IV (PRACTICALS)****Time: 03 Hours****Max. Marks: 40****Note:** Duly certified practical record shall be submitted for evaluation at the examination.**Distribution of Marks**

Record	5 Marks
Part A	25 Marks
Part B	10 Marks

**PART A****Q.No.1: Physical Chemistry (Non-Instrumental) Experiments****25 Marks**

Any one of the following experiments shall be given to the candidate.

1. Determination of the density of liquid using specific gravity bottle and its surface tension using Stalagmometer [Carbon tetrachloride, ethyl acetate, water and 1% NaCl].
2. Determination of the density of liquid using specific gravity bottle and its viscosity using Ostwald's viscometer [Carbon tetrachloride, ethyl acetate, water and 1% NaCl].
3. Determination of rate constant of the decomposition of hydrogen peroxide catalyzed by  $\text{FeCl}_3$  solution.
4. Determination of rate constant of saponification of ethyl acetate.
5. Determination of amount of HCl in the given solution using 1N NaOH solution by thermometric titration method.
6. Determination of percentage composition of the given NaCl solution by miscibility. Temperature method (water phenol system)
7. Determination of first order rate constant of acid hydrolysis of ethyl acetate.

**DISTRIBUTION OF MARKS**

Experiment	Density of the liquid		Surface tension of the liquid		Viscosity of the liquid	
	Error	Marks	Error	Marks	Error	Marks
Determination of density and surface tension of the liquid. <b>OR</b> Determination of density and viscosity of the given liquid	$\pm 2\%$	08	$\pm 4\%$	12	$\pm 4\%$	12
	$\pm 3\%$	06	$\pm 6\%$	10	$\pm 6\%$	10
	$\pm 4\%$	04	$\pm 8\%$	08	$\pm 8\%$	08
	Any other value	02	Any other value	04	Any other value	04
	Calculation and unit	01+ 01	Calculation and unit	02 + 01	Calculation and unit	02 + 01

Experiment			Marks	
Determination of percentage composition of the given NaCl solution by miscibility Temperature method (water phenol system)	<b>Experiment Skill</b>		04	
	<b>Unknown 1</b>		<b>Unknown 2</b>	
	<b>Error</b>	<b>Marks</b>	<b>Error</b>	<b>Marks</b>
	8 %	08	8 %	08
	10 %	06	10 %	06
	12 %	04	12 %	04
	Any other value	02	Any other value	02
	Graph	05		

Experiment	Constant values of K	Marks
Determination of first order rate constant of decomposition of hydrogen peroxide using ferric chloride catalyst <b>OR</b>	05 Values	16
	04 Values	14
	03 Values	12
	02 Values	10
Determination of second order rate constant of saponification of ester. <b>OR</b>	Any other value	06
	Calculation	03
	Unit	01
	Graph	04
Determination of first order rate constant of acid hydrolysis of ester.	K from the Graph	01
Experiment	Error	Marks
Determination of amount of HCl in the given solution using 1N NaOH solution by thermometric titration method	$\pm 0.2 \text{ cm}^3$	18
	$\pm 0.3 \text{ cm}^3$	16
	$\pm 0.4 \text{ cm}^3$	14
	$\pm 0.5 \text{ cm}^3$	12
	Any other value	08
	Graph	04
	Calculation of Normality and Weight/liter	02
	Unit	01

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**PART B**

**Q.No.2: Procedure writing for any one of the following experiments including reactions, structure wherever necessary.** **10 Marks**

1. Determination of iron in the given sample of hematite using potassium dichromate.
2. Estimation of manganese in the given sample of pyrolusite.
3. Estimation of calcium and magnesium in the given sample of dolomite by EDTA method.

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