CHEMISTRY



Program Code: UCH

2021-2022 onwards



MANNAR THIRUMALAI NAICKER COLLEGE

(AUTONOMOUS) Re-accredited with "A" Grade by NAAC PASUMALAI, MADURAI – 625 004

Eligibility for Admission

should have passed the Higher Secondary Examination conducted by the Candidate Board of Higher Secondary Education, Government of Tamil Nadu, CBSE Board with Science as one of the subjects in Higher Secondary Education.

Subjects of Study

Part I : Tamil / Company Secretarial Practice and Modern Office Management

Part II : English

:

:

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Part III

- 1. Core Subjects
- 2. Allied Subjects
- 3. Electives

Part IV

- 1. Non Major Electives (II Year)
- 2. Skill Based Subjects
- 3. Environmental Studies Mandatory Subject
- 4. Value Education Mandatory Subject

Part V

Extension Activities

Pattern of the question paper for the Continuous Internal Assessment Note: Duration – 1 hour

(For Part I, Part II & Part III)

| The components for continuous internal assessment are | : |
|---|------------------|
| Part –A | |
| Four multiple choice questions (answer all) | 4 x01= 04 Marks |
| Part –B | |
| Three short answers questions (answer all) | 3 x02= 06 Marks |
| Part –C | |
| Two questions ('either or 'type) | 2 x 05=10 Marks |
| Part –D | |
| Two questions out of three | 1 x 10 =10 Marks |
| - | |
| Total | 30 Marks |

The scheme of Examination for Part-I, II & III

 The components for continuous internal assessment are:

 (60 Marks of two continuous internal assessments will be converted to 15 marks)

 Two tests and their average
 --15 marks

 Seminar /Group discussion
 --5 marks

 Assignment
 --5 marks

 Total
 25 Marks

| Pattern of the question paper for the Summative Exa | minations: | |
|--|---------------|------------|
| Note: Duration- 3 hours | | |
| Part –A | | |
| Ten multiple choice questions | 10 x01 | = 10 Marks |
| No Unit shall be omitted: not more than two questions fi | rom each unit | .) |
| Part –B | | |
| Short answer questions (one question from each unit) | 5 x02 | = 10 Marks |
| | | |
| Part –C | | |
| Five Paragraph questions ('either or 'type) | 5 x 05 | = 25 Marks |
| (One question from each Unit) | | |
| Part –D | | |
| Three Essay questions out of five | 3 x 10 | =30 Marks |
| (One question from each Unit) | | |
| | | |
| Total | | 75 Marks |
| | | |

Part-IV- Skill Based Papers / NME:

The Scheme of Examination for Skill Based Papers: (Except Practical Lab Subjects) Pattern of the questions paper for the continuous Internal Assessment

45 MCQs will be asked for each internal assessment tests (45 x 1=45 Marks) **and converted for 15 marks**

The components for continuous internal assessment are:

| Two tests and their average | 15 marks |
|-----------------------------|----------|
| Seminar /Group discussion | 5 marks |
| Assignment | 5 marks |
| | |
| Total | 25 Marks |
| | |

Summative Examination Pattern

Pattern of the Question Paper for Skill Based Papers (External)

75 Multiple choice questions will be asked from five units (75 x 1=75 Marks)

(15MCQ's from each unit)

Part-IV- Environmental Studies and Value Education

The Scheme of Examination (Environmental Studies and Value Education)

| Two tests and their average | 15 marks |
|-----------------------------|-----------|
| Project Report | 10 marks* |
| Total | 25 marks |

* The students as Individual or Group must visit a local area to document environmental assets – river / forest / grassland / hill / mountain – visit a local polluted site – urban / rural / industrial / agricultural – study of common plants, insects, birds – study of simple ecosystem – pond, river, hill slopes, etc.

Question Paper Pattern

(Internal Assessment)

Pattern of the Question Paper for Environmental Studies & Value Education only) (Internal)

45 MCQs will be asked for each internal assessment tests (45 x 1=45 Marks) **and converted for 15 marks**

| | Total | 25 Marks |
|-----------------------------|-------|--------------|
| | | |
| Project | | 10 marks |
| Two tests and their average | | 15 marks |

Summative Examination Pattern

Pattern of the Question Paper for Environmental Studies & Value Education only) (External)

75 Multiple choice questions will be asked from five units (75 x 1=75 Marks)

(15MCQ's from each unit)

Part V Extension Activities: (Maximum Marks: 100)

- 1. NCC
- 2. NSS
- 3. Physical Education
- 4. YRC
- 5. RRC
- 6. Health & Fitness Club
- 7. Eco Club
- 8. Human Rights Club

Pattern of the Question Paper for (Internal Examination & Summative Examination)

Internal Examinations- - 40 MarksSummative Examinations- - 60 Marks

100

Minimum Marks for a Pass

40% of the aggregate (Internal +Summative Examinations).No separate pass minimum for the Internal Examinations.27 marks out of 75 is the pass minimum for the Summative Examinations.

VISION

Department of Chemistry undertakes to aspires young adult to excel in Chemical Education, Research and Services to contribute to a chemically literate society through teaching, scholarship and service.

MISSION

To produce employable graduates in various areas and demonstrate science as a human endeavor and as a way to understand the natural world

The 12 Graduate Attributes*:

- 1. (KB) A knowledge base for engineering: Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.
- 2. (PA) Problem analysis: An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions
- 3. (Inv.) Investigation: An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data and synthesis of information in order to reach valid conclusions.
- 4. (Des.) Design: An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.
- 5. (Tools) Use of engineering tools: An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.
- 6. (Team) Individual and teamwork: An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.
- 7. (Comm.) Communication skills: An ability to communicate complex engineering concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.
- 8. (Prof.) Professionalism: An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.
- 9. (Impacts) Impact of engineering on society and the environment: An ability to analyze social and environmental aspects of engineering activities. Such ability includes an understanding of the interactions that engineering has with the economic, social, health, safety, legal, and cultural aspects of society, the uncertainties in the prediction of such

interactions; and the concepts of sustainable design and development and environmental stewardship.

- 10. (Ethics) Ethics and equity: An ability to apply professional ethics, accountability, and equity.
- 11. (Econ.) Economics and project management: An ability to appropriately incorporate economics and business practices including project, risk, and change management into the practice of engineering and to understand their limitations.
- 12. (LL) Life-long learning: An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge

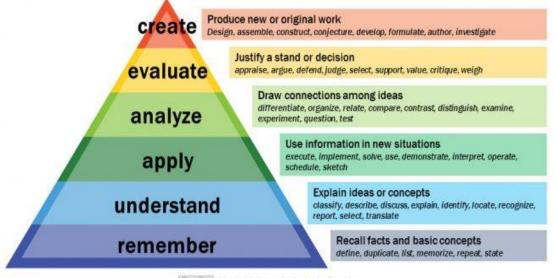
| WA | Graduate Attributes | Caption as |
|------|---|---|
| 1 | A knowledge base for engineering: Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program. | Disciplinary Knowledge |
| 2 | An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions. | Problem Analysis |
| 3 | An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data and synthesis of information in order to reach valid conclusions. | Investigation |
| 7 | An ability to communicate complex engineering concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions. | Communication skills |
| 6,10 | An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting. An ability to apply professional ethics, accountability, and equity. | Individual and Team Work & Ethics |
| 5,12 | An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations. An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge | Use of Engineering Tools & Life- Long Learning |

| | PROGRAM EDUCATIONAL OBJECTIVES (PEOs) |
|---------------|--|
| | On completion of the Programme, the Student will be able to |
| PEO1: | Enhance the students to nurture the requirements of industries/laboratories related to |
| | chemistry including pharmaceutical/analytical chemistry. |
| PEO2: | Enable the students to demonstrate information literacy skills for acquiring |
| 1102. | knowledge of chemistry, as a chemist/researcher and also as a life-long learner. |
| | Develop the students to communicate effectively the scientific and research |
| PEO3 : | information in both written and oral formats, to both professional scientists and to |
| | the public. |
| PEO4: | Collaborate with Industry and Alumni to explore the new avenues in respective |
| I E04. | domains and raise the employability ratio. |
| PEO5: | Adhere towards the ethical and environmental sustainability to create morally |
| LO2. | upright and empowered citizens to face industry/ institution. |
| PEO6: | Nurture environmental awareness and develop communal harmony in respective of |
| LEO0: | national integration. |

| PO NO | PROGRAMME OUTCOMES (POs) | |
|---------------|---|--|
| At the end | l of the programme, the students will be able to | |
| PO – 1 | Demonstrate the knowledge and understanding of Science concepts and its relevant fields. | Disciplinary Knowledge |
| PO – 2 | Identify, formulate, analyse complex problems and reach valid conclusions using the methodologies of Science. | Problem Solving |
| PO – 3 | Employ critical and analytical thinking in understanding the concepts and apply them in various problems appearing in different branches of Science. | Analytical Reasoning & Critical Thinking |
| PO - 4 | Communicate the known concepts effectively within the profession and with any forum | Communication Skills |
| PO - 5 | Function successfully as a member/leader in any team and to apply ethics, accountability and equity in their life. | Team Work and Moral/Ethical Awareness |
| PO - 6 | Use ICT tools in various learning situations, related information sources, suitable software to analyze data and furthermore participating in learning activities throughout life to meet the demands of work place through knowledge /up-skilling / re-skilling | Digital Literacy & Life-long Learning |

| S.No. | Graduate Attributes | PROGRAM SPECIFIC OUTCOME (PSOs) |
|-------|---------------------------------------|--|
| PSO1: | Knowledge Base | Learn various concepts of organic, inorganic, physical chemistry, their biological aspects and their application in day-to-day life. |
| PSO2: | Problem Analysis & Investigation | Design towards executing experiments and confident handling of equipment's in Chemistry for industries. |
| PSO3: | Communication Skills & Design | Execute new ideas in the field of research and development using principles and techniques of science learned through activities such as expert lecturers, workshops, seminars and field projects. |
| PSO4: | Professionalism, Ethics and Equity | Aspire the knowledge of green environment learned through green chemistry and pollution free scenario |
| PSO5: | Individual & Team Work | Work effectively with a set of teams using modern technical skills and innovative research ideas in Chemistry areas |
| PSO6: | Lifelong learning | Develop employability and entrepreneurship skills learned through industry-based curriculum |

Bloom's Taxonomy



Vanderbilt University Center for Teaching

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS), MADURAI B.Sc., CHEMISTRY., CURRICULUM

| Course Code | Title of the Course | Hrs | Credits | Maxi | mum M | larks |
|--------------------|---------------------------------------|-----|---------|------|-------|-------|
| | | | Int | Ext | Total | |
| | FIRST SEMEST | ER | | | | |
| Part – I | Tamil / Alternative Course | | | | | |
| 21UTAG11 | இக்காலக் கவிதையும் நாடகமும் | 6 | 3 | 25 | 75 | 100 |
| Part – II | English | | | | | |
| 21UENG11 | Communicative English - I | 6 | 3 | 25 | 75 | 100 |
| Part - III | Core Courses | | | | | |
| 21UCHC11 | Inorganic Chemistry -I | 4 | 4 | 25 | 75 | 100 |
| | Major Chemistry Practical – I | | | | | |
| 21UCHCP1 | (Inorganic Semi Micro-Qualitative | 2 | - | - | - | |
| | analysis) | | | | | |
| Part III | Allied Course | | | | | |
| | Allied Physics – I | | | | | |
| 21UPHA11 | (Mechanics, Properties of Matter, | 4 | 4 | 25 | 75 | 100 |
| | Heat and Sound) | | | | | |
| 21UPHAP1 | Allied Physics Practical – I | 2 | - | - | - | - |
| Part IV | Skill Based Course | | | | | |
| 21UCHS11 | Cosmetic Chemistry | 2 | 2 | 25 | 75 | 100 |
| 21UCHS12 | Green Chemistry | 2 | 2 | 25 | 75 | 100 |
| Part IV | Mandatory Course | | | | | |
| 21UEVG11 | Environmental Studies | 2 | 2 | 25 | 75 | 100 |
| | Total | 30 | 20 | 175 | 525 | 700 |
| | SECOND SEMES | TER | | - | | - |
| Part – I | Tamil / Alternative Course | | | | | |
| 21UTAG21 | இடைக்கால இலக்கியமும் சிறுகதையும் | 6 | 3 | 25 | 75 | 100 |
| Part – II | English | | | | | |
| 21UENG21 | Communicative English -II | 6 | 3 | 25 | 75 | 100 |
| Part - III | Core Courses | | | | | |
| 21UCHC21 | Organic Chemistry -I | 4 | 4 | 25 | 75 | 100 |
| | Major Chemistry Practical – I | | | | | |
| 21UCHCP1 | (Inorganic Semi Micro-Qualitative | 2 | 2 | 40 | 60 | 100 |
| | analysis) | | | | | |
| Part III | Allied Course | | | | | |
| | Allied Physics – II | | | | | |
| 21UPHA21 | (Electricity, Electronics, Optics and | 4 | 3 | 25 | 75 | 100 |
| | Modern Physics) | | | | | |
| 21UPHAP1 | Allied Physics Practical – I | 2 | 1 | 40 | 60 | 100 |
| Part IV | Skill Based Course | | | | | |
| 21UCHS21 | Dairy Chemistry | 2 | 2 | 25 | 75 | 100 |
| 21UCHS22 | Dye Chemistry | 2 | 2 | 25 | 75 | 100 |
| Part IV | Mandatory Course | | | | | |
| 21UVLG21 | Value Education | 2 | 2 | 25 | 75 | 100 |
| | Total | 30 | 22 | 255 | 645 | 900 |

(For the student admitted during the academic year 2021-2022 onwards)

| | THIRD SEMEST | ER | | | | |
|---------------------------|--|-----|----|-----|-----|-----|
| Part – I | Tamil / Alternative Course | | | | | |
| 21UTAG31 | காப்பிய இலக்கியமும் உரைநடையும் | 6 | 3 | 25 | 75 | 100 |
| Part – II | English | | | | | |
| 21UENG31 | Communicative English-III | 6 | 3 | 25 | 75 | 100 |
| Part - III | Core Courses | | | | | |
| 21UCHC31 | Physical Chemistry – I | 4 | 4 | 25 | 75 | 100 |
| 21UCHC32 | Inorganic Chemistry – II | 4 | 4 | 25 | 75 | 100 |
| 21UCHCP2 | Major Chemistry Practical – II (Volumetric Analysis) | 2 | - | - | - | - |
| Part III | Allied Course | | | | | |
| 21UMCA32 / 21UMBA32 | Allied Mathematics – I / Allied Microbiology – I: Fundamentals of Microbiology | 6 | 4 | 25 | 75 | 100 |
| Part IV | Non-Major Elective Course | | | | | |
| 21UCHN31 | Basic Concepts in Chemistry | 2 | 2 | 25 | 75 | 100 |
| | Total | 30 | 20 | 150 | 450 | 600 |
| | FOURTH SEMES | TER | | | | |
| Part – I | Tamil / Alternative Course | | | | | |
| 21UTAG41 | பண்டைய இலக்கியமும் புதினமும் | 6 | 3 | 25 | 75 | 100 |
| Part – II | English | | | | | |
| 21UENG41 | Communicative English -IV | 6 | 3 | 25 | 75 | 100 |
| Part - III | Core Courses | | | | | |
| 21UCHC41 | Organic Chemistry – II | 4 | 4 | 25 | 75 | 100 |
| 21UCHC42 | Physical Chemistry – II | 4 | 4 | 25 | 75 | 100 |
| 21UCHCP2 | Major Chemistry Practical – II (Volumetric Analysis) | 2 | 2 | 40 | 60 | 100 |
| Part III | Allied Course | | | | | |
| 21UMCA43 / 21UMBA42 | Allied Mathematics – II / Allied Microbiology – II: Applied Microbiology | 6 | 4 | 25 | 75 | 100 |
| Part IV | Non-Major Elective Course | | | | | |
| 21UCHN41 | Water Treatment | 2 | 2 | 25 | 75 | 100 |
| Part V | Extension Activities | | | | | |
| 21UEAG40- | NSS, NCC, YRC | | 1 | 40 | (0) | 100 |
| 21UEAG49 | | - | 1 | 40 | 60 | 100 |
| | Total | 30 | 23 | 230 | 570 | 800 |

| | FIFTH SEMEST | ER | | | | |
|------------|---|-----|-----|------|------|------|
| Part - III | Core Courses | | | | | |
| 21UCHC51 | Organic Chemistry – III | 6 | 6 | 25 | 75 | 100 |
| 21UCHCP3 | Major Chemistry Practical – III (Physical Chemistry experiments) | 6 | 5 | 40 | 60 | 100 |
| 21UCHCP4 | Major Chemistry Practical – IV (Gravimetric Analysis and Organic Preparation) | 3 | - | - | - | - |
| 21UCHCP5 | Major Chemistry Practical – V (Organic Analysis and Estimation) | 3 | - | - | - | _ |
| Part III | Core Elective | | | | | |
| 21UCHE51 | Analytical Chemistry | | | | | |
| 21UCHE52 | Nuclear, Industrial Chemistry & Metallic State | 5 | ~ | 25 | 75 | 100 |
| 21UCHE53 | Supramolecular Chemistry | 5 | 5 | 25 | 75 | 100 |
| 21UCHE54 | Bioinorganic Chemistry | | | | | |
| 21UCHE55 | Chemistry in crime investigation | 5 | 5 | 25 | 75 | 100 |
| 21UCHE56 | Food Processing Chemistry | | | | | |
| Part IV | Skill Based Course | | | | | |
| 21UCHS51 | Drug Chemistry | 2 | 2 | 25 | 75 | 100 |
| | Total | 30 | 23 | 140 | 360 | 500 |
| | SIXTH SEMEST | ER | | | | |
| Part - III | Core Courses | | | | | |
| 21UCHC61 | Physical Chemistry – III | 6 | 6 | 25 | 75 | 100 |
| 21UCHCP4 | Major Chemistry Practical – IV (Gravimetric Analysis and Organic Preparation) | 3 | 5 | 40 | 60 | 100 |
| 21UCHCP5 | Major Chemistry Practical – V (Organic Analysis and Estimation) | 3 | 5 | 40 | 60 | 100 |
| 21UCHPR1 | Project and viva voce | 6 | 4 | 40 | 60 | 100 |
| Part III | Core Elective Courses | | | | | |
| 21UCHE61 | Applied Chemistry | | | | | |
| 21UCHE62 | Soil and Agriculture Chemistry | F | F | 25 | 75 | 100 |
| 21UCHE63 | Fuel Chemistry | 5 | 5 | 25 | 75 | 100 |
| 21UCHE64 | Nano Chemistry | | | | | |
| 21UCHE65 | Clinical and Medicinal Chemistry | _ | F | 25 | 75 | 100 |
| 21UCHE66 | Applied Electrochemistry | 5 | 5 | 25 | 75 | 100 |
| Part IV | Skill Based Course | | | | | |
| 21UCHS61 | Polymer Chemistry | 2 | 2 | 25 | 75 | 100 |
| | Total | 30 | 32 | 220 | 480 | 700 |
| | Grand Total | 180 | 140 | 1170 | 3030 | 4200 |





MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name INORGANIC CHEMISTRY – I | | | | | | | | | | |
|--|---|----------|--------|---|--|--|--|--|--|--|
| Course Code | 21UCHC11 | L | Р | С | | | | | | |
| Category | Core | 4 | - | 4 | | | | | | |
| Nature of cours | se: EMPLOYABILITY ✓ SKILL ORIENTED ENTREPRENI | EURS | HIP | Image: A set of the set of the | | | | | | |
| Course Objectives: | | | | | | | | | | |
| • To Recall the structure of atom and also know the various model of an atom for the structure of | | | | | | | | | | |
| the atoms. | | | | | | | | | | |
| | ber the basics of periodic table and atomic properties to relate their pri | nciple | S | | | | | | | |
| - | e the types of bonds to relate their relations between them. | 1.41 | | | | | | | | |
| • To Perform of molecule | the chemical bonding and VSEPR theory and their applications to fin | a the | geome | etry | | | | | | |
| | ne the various concepts on Acids and Bases and also know the positio | ns of 1 | vdro | ren | | | | | | |
| and its prop | - | 115 01 1 | iyuro | gen | | | | | | |
| ^ _ _ | RUCTURE OF ATOM | | 12 | | | | | | | |
| | onstituents of atom (elementary idea) - Rutherford model of an atom - | Mosl | ey's | | | | | | | |
| determination of | of atomic number – mass number. Quantum theory: Black body radiati | on – p | hoto | | | | | | | |
| electric effect - | Compton effect - Bohr model of atom: postulate and hydrogen spectr | um – | de | | | | | | | |
| 0 1 | ions – Heisenberg's uncertainty principle – Quantum numbers – Pauli | 's exc | lusion | l | | | | | | |
| · · · | bau principle – Hund's rule – electronic configuration of atoms. | | | | | | | | | |
| Unit: IIPERIODIC TABLE AND ATOMIC PROPERTIES12 | | | | | | | | | | |
| | of periodic table- periodic law and electronic configuration of eleme | | | | | | | | | |
| | lationship. Atomic properties- Size of atom- Atomic Volumes - Ior | | | | | | | | | |
| | ty- Electronegativity- Different scales- Diagonal relationship- C | | | n of | | | | | | |
| | basis of their electronic configuration- (further extension of periodic IEMICAL BONDING | table). | 12 | | | | | | | |
| | ical bonding – octet rule – ionic bond – covalent bond – valence bor | nd anr | | - its | | | | | | |
| | ajan's rule – VSEPR theory and its limitations – application of VSEP | | | | | | | | | |
| | olecules (NH ₃ and H ₂ O) – hybridization – sp, sp ² , sp ³ , sp ³ d ² and (Be | | | | | | | | | |
| | blecular Orbital theory – LCAO method – MO diagram for homo nuc | | | | | | | | | |
| | ic molecules $-$ H ₂ , He ₂ , Li ₂ , Be ₂ , C ₂ , N ₂ , O ₂ , F ₂ , CO and HF $-$ d | | | | | | | | | |
| magnetic prope | rty and bond order | | | | | | | | | |
| Unit: IV AC | | | | | | | | | | |
| Arrhenius concept-Lowry Bronsted -Lewis concepts-Lux Flood solvent system concepts - | | | | | | | | | | |
| Usonowich concept. Factors influencing the acidic and basis properties (steric effect, +I and -I | | | | | | | | | | |
| effect, resonance effect and electronegativity effect). Oxo acids and strength of oxo acids. | | | | | | | | | | |
| Unit: V HYDROGEN, OZONE AND HYDROGEN PEROXIDE 12 | | | | | | | | | | |
| Hydrogen: Position of hydrogen in periodic table – resemblance of hydrogen with alkali metals – | | | | | | | | | | |
| | resemblance with halogens – special position of hydrogen – resemblance with carbon – preparation – manufacture – pure hydrogen – ortho and para hydrogen – occluded hydrogen – uses – Isotopes of | | | | | | | | | |
| | topic effect – hydrides – classification – examples. Ozone : Commerce | | | | | | | | | |
| | s, structure. Hydrogen peroxide : Manufacture – properties – struct | | | | | | | | | |
| | ermanganometric and iodimetric method – strength of hydrogen perox | | | | | | | | | |
| | <u> </u> | | | _ | | | | | | |

| | Total Lecture Hou | rs 60 Hrs |
|-------------|--|----------------|
| Books | for Study: | |
| 1. B.F | R. Puri, L.R.Sharma & K.C. Kalia, Principles of Inorganic Chemistry Miles | tone Publisher |
| | t edition, New Delhi 2013 | |
| Books | for References: | |
| 1. Pt | ri, Sharma & Kalia, Principles of Inorganic Chemistry Milestone publisher | & distributor, |
| | ew Delhi 2009. | |
| 2. R. | D Madan S.Chand, Modern Inorganic Chemistry band Co.Ltd, New Delhi 20 | 12. |
| | D.Lee, Wiley India, Concise Inorganic Chemistry 5th Edition, New Delhi 2009 | |
| Web R | Resources: | |
| 1. https | :://bit.ly/3tu7P32 | |
| | :://bit.ly/2Qev0Ac | |
| | :://bit.ly/3bRnjs6 | |
| | :://bit.ly/30R8dww | |
| | e Outcomes | K Level |
| On th | e completion of the course the student will be able to | |
| CO1: | Recall the general characteristics of sub atomic particles of an atom and | [Up to K2] |
| | periodicity | |
| CO2: | Discuss the long form periodic table, types of chemical bonds and concept of | [Up to K3] |
| | Acids and Bases. | |
| CO3: | Prepare the hydrogen, ozone and hydrogen peroxide and compute the | [Up to K3] |
| | properties with alkali metals | |
| CO4: | Examine the Quantum model of an atom and VSEPR theory to find the | [Up to K4] |
| | geometry of molecules | |
| CO5: | Apply various types of bonds and quantum model of atom for the geometry | [Up to K4] |
| | of molecules | - |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | | |
|-----------------|--------------------------|-------------|-------------|------|-------------|-------------|--|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | | |
| CO5 | 1 | 3 | 2 | 3 | 2 | 1 | | | |
| Weightage | 10 | 10 | 10 | 11 | 9 | 11 | | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| Unit | Course Name | Hrs | Pedagogy |
|------|---|-----|------------------------------------|
| I | STRUCTURE OF ATOM An outline of constituents of atom (elementary idea) – Rutherford model of an atom – Mosley's determination of atomic number – mass number. Quantum theory: Black body radiation – photo electric effect – Compton effect – Bohr model of atom: postulate and hydrogen spectrum – de Broglie's equations – Heizenberg's uncertainty principle – Quantum numbers – Pauli's exclusion principle – Aufbau principle – Hund's rule – electronic configuration of atoms. | 12 | Chalk, Talk & Power point |
| II | PERIODIC TABLE AND ATOMIC PROPERTIES The long form of periodic table- periodic law and electronic configuration of elements- Horizontal and vertical relationship. Atomic properties- Size of atom- Atomic Volumes - Ionisation energy- electron affinity- Electronegativity- Different scales- Diagonal relationship-Classification of elements on the basis of their electronic configuration - (further extension of periodic table). | 12 | Chalk, Talk & Power point |
| III | CHEMICAL BONDING Cause of chemical bonding – octet rule – ionic bond – covalent bond – valence bond approach- its limitations – Fajan's rule – VSEPR theory and its limitations – application of VSEPR theory to find geometry of molecules (NH ₃ and H ₂ O) – hybridization – sp, sp ² , sp ³ , sp ³ d ² and (BeF ₂ , BCl ₃ , CH ₄ , SF ₆ , H ₂ O)- Molecular Orbital theory – LCAO method – MO diagram for homo nuclear and hetero nuclear diatomic molecules – H ₂ , He ₂ , Li ₂ , Be ₂ , C ₂ , N ₂ , O ₂ , F ₂ , CO and HF – determination of magnetic property and bond order | 12 | Chalk, Talk & Power point |
| IV | ACIDS AND BASES Arrhenius concept-Lowry Bronsted –Lewis concepts-Lux Flood solvent system concepts -Usonowich concept. Factors influencing the acidic and basis properties (steric effect, +I and –I effect, resonance effect and electronegativity effect). Oxo acids and strength of oxo acids. | 12 | Chalk, Talk & Power point |
| V | HYDROGEN, OZONE AND HYDROGEN PEROXIDE Hydrogen: Position of hydrogen in periodic table – resemblance of hydrogen with alkali metals – resemblance with halogens – special position of hydrogen – resemblance with carbon – preparation – manufacture – pure hydrogen – ortho and para hydrogen – occluded hydrogen – uses – Isotopes of hydrogen – Isotopic effect – hydrides – classification – examples. Ozone: Commercial preparation, properties, uses, structure. Hydrogen peroxide: Manufacture – properties – structure and uses – estimation by permanganometric and iodimetric method – strength of hydrogen peroxide. | 12 | Chalk, Talk & Power point |

Course Designed by: Dr. V. Ramasamy Raja & Dr. J.E. Sangeetha

| | Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs) | | | | | | | | | | |
|--|--|---------------------------------|----------------------------|-----------------|--------------------------------------|------------------------|----------------------------------|-----------------------------|--|--|--|
| | | | Sectio | on A | Sectio | | | ~ | | | |
| Inte rnal Cos | | K Level | MC No. of. Questions | Qs K – Level | Short Aı No. of. Questio ns | nswers K - Level | Section C Either or Choice | Section D Open Choice | | | |
| CI | CO1 | Up to K2 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | |
| AI CO2 | | Up to K3 | 2 | K1 & K2 | 2 | K2 | 2 (K3&K3) | 2(K2 & K3) | | | |
| CI CO3 AII CO4 Question Pattern CIA I & II | | Up to K2 | 2 | K1 & K2 | 1 | K2 | 2 (K2&K2) | 1(K2) | | | |
| | | Up to K4 | 2 | K1 & K2 | 2 | K2 | 2 (K3&K3) | 2(K3 &K4) | | | |
| | | No. of Questions to be asked | 4 | | 3 | | 4 | 3 | | | |
| | | No. of Questions to be answered | 4 | | 3 | | 2 | 2 | | | |
| | | Marks for each question | 1 | | 2 | | 5 | 10 | | | |
| | | Total Marks for each section | 4 | | 6 | | 10 | 20 | | | |

| | | | Distribution (| of Marks with | K Level CL | A I & CIA | II | |
|-----|------------|--|---|--------------------------------------|-------------------------------|----------------|--------------------------------------|---------------------|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % |
| | K1 | 2 | 2 | - | - | 4 | 6.67 | |
| | K2 | 2 | 4 | 10 | 20 | 36 | 60 | 67 |
| CIA | K3 | - | - | 10 | 10 | 20 | 33.33 | 33 |
| I | K4 | - | - | - | - | - | - | - |
| - | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 |
| | K1 | 2 | 2 | - | - | 4 | 6.67 | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 43.33 | 50 |
| CIA | K3 | - | - | 10 | 10 | 20 | 33.33 | 33 |
| II | K4 | - | - | - | 10 | 10 | 16.67 | 17 |
| | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| S | Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs) | | | | | | | | | | |
|------------------------------|---|---------------|-------------------------|--------------|--------------------|--------------|----------------------------|-------------------------------|--|--|--|
| | | | MC | | Short An | swers | Section C | Section D | | | |
| S.No Cos K - Level | | | No. of Question s | K – Level | No. of Question | K – Level | (Either / or Choice) | Section D (Open Choice) | | | |
| 1 | CO1 | Up to K 2 | 2 | K1,K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | |
| 2 | CO2 | Upto K 3 | 2 | K1&K2 | 1 | K1 | 2 (K3&K3) | 1(K3) | | | |
| 3 | CO3 | Up to K 3 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K3) | | | |
| 4 | CO4 | Up to K 4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | | | |
| 5 | CO5 | Up to K 4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | | | |
| No. of | Questions | s to be Asked | 10 | | 5 | | 10 | 5 | | | |
| No | o.of Questi answe | | 10 | | 5 | | 5 | 3 | | | |
| Maı | rks for eac | h question | 1 | | 2 | | 5 | 10 | | | |
| Total Marks for each section | | | 10 | | 10 | | 25 | 30 | | | |
| | (Figures | in parenthesi | is denotes, q | uestions s | hould be as | ked with | the given K | level) | | | |

| | Distribution of Marks with K Level | | | | | | | | | | |
|------------|--|---|-------------------------------------|--------------------------------|----------------|--------------------------------------|-------------------|--|--|--|--|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % | | | | |
| K1 | 5 | 4 | - | - | 9 | 7.5 | 33 | | | | |
| K2 | 5 | 6 | 10 | 10 | 31 | 25.83 | 55 | | | | |
| K3 | - | - | 40 | 20 | 60 | 50 | 50 | | | | |
| K4 | - | _ | - | 20 | 20 | 16.67 | 17 | | | | |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 | | | | |

 NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

| Q.No CO K Level Questions 1 CO1 K1 | Section | A (Mu | iltiple Cho | ice Questions) |
|---|---------|---------|-------------|--|
| 1 CO1 K1 2 CO1 K2 3 CO2 K1 4 CO2 K2 5 CO3 K1 6 CO3 K2 7 CO4 K1 8 CO4 K2 9 CO5 K1 10 CO5 K2 Section B (Short Answers) Answer All Questions (5x2=10 max Q.No CO K Level Questions 11 CO1 K1 11 12 CO2 K1 11 13 CO3 K2 14 14 CO4 K2 15 15 CO5 K2 15 Section C (Either/Or Type) Answer All Questions (5 x 5 = 25 max 16) a CO1 K2 16) b 16) a CO1 K2 17) b CO2 17) b CO2 K3 11 18) b | Answe | r All Q | uestions | (10x1=10 marks) |
| 2 CO1 K2 3 CO2 K1 4 CO2 K2 5 CO3 K1 6 CO3 K2 7 CO4 K1 8 CO4 K2 9 CO5 K1 10 CO5 K2 Section B (Short Answers) Answer All Questions (5x2=10 max Q.No CO K Level Questions 11 CO1 K1 11 12 CO2 K1 11 13 CO3 K2 14 14 CO4 K2 15 15 CO5 K2 15 Section C (Either/Or Type) Answer All Questions (5 x 5 = 25 max Q.No CO K2 16) a 17) a 16) a CO1 K2 17) b 10 17) b CO2 K3 18) a 10 18) a CO3 K3 19) b 10 19) b CO4 K3 10 < | Q.No | CO | K Level | Questions |
| 3 CO2 K1 4 CO2 K2 5 CO3 K1 6 CO3 K2 7 CO4 K1 8 CO4 K2 9 CO5 K1 10 CO5 K2 Section B (Short Answers) Answer All Questions Answer All Questions (5x2=10 ma) Q.No CO K Level 11 CO1 K1 12 CO2 K1 13 CO3 K2 14 CO4 K2 15 CO5 K2 Section C (Either/Or Type) Answer All Questions Answer All Questions (5 x 5 = 25 ma) (6) a CO1 K2 16) b CO1 K2 17) a CO2 K3 18) a CO3 K3 18) a CO3 K3 19) b CO4 K3 19) b CO5 K3 20) b CO5 K3 20 | 1 | CO1 | K1 | |
| 4 CO2 K2 5 CO3 K1 6 CO3 K2 7 CO4 K1 8 CO4 K2 9 CO5 K1 10 CO5 K2 Section B (Short Answers) Answer All Questions 11 CO1 K1 12 CO2 K1 13 CO3 K2 14 CO4 K2 15 CO5 K2 Section C (Either/Or Type) Answer All Questions (5 x 5 = 25 ma) Q.No CO K Level Questions 16) a CO1 K2 17) a CO2 K3 18) a CO3 K3 19) b CO4 K3 20) a CO5 K3 20) b CO5 K3 20) b CO5 K3 20) b CO5 K3 | 2 | CO1 | K2 | |
| 5 CO3 K1 6 CO3 K2 7 CO4 K1 8 CO4 K2 9 CO5 K1 10 CO5 K2 Section B (Short Answers) Answer All Questions 11 CO1 K1 12 CO2 K1 13 CO3 K2 Section C (Either/Or Type) Answer All Questions (5 x 5 = 25 ma) Q.No CO K Level Questions 16) a CO1 K2 (5 x 5 = 25 ma) Q.No CO K Level Questions 16) a CO1 K2 (5 x 5 = 25 ma) Q.No CO K Level Questions 17) b CO2 K3 (5 x 5 = 25 ma) 17) b CO2 K3 (5 x 5 = 25 ma) 18) a CO3 K3 (5 x 5 = 25 ma) 19) b CO4 K3 (5 x 5 = 25 ma) 17) b CO2 K3 (5 x 5 = 25 ma) | 3 | CO2 | K1 | |
| 6 CO3 K2 7 CO4 K1 8 CO4 K2 9 CO5 K1 10 CO5 K2 Section B (Short Answers) Answer All Questions 11 CO1 K1 12 CO2 K1 13 CO3 K2 14 CO4 K2 15 CO5 K2 Section C (Either/Or Type) Answer All Questions 16) a CO1 K2 17) a CO2 K3 17) b CO2 K3 17) b CO2 K3 18) a CO3 K3 18) b CO3 K3 19) b CO4 K3 20) a CO5 K3 20) b CO5 K3 20) b CO5 K3 20) b CO5 K3 20) b CO5 | 4 | CO2 | K2 | |
| 7 CO4 K1 8 CO4 K2 9 CO5 K1 10 CO5 K2 Section B (Short Answers) Answer All Questions (5x2=10 ma) Q.No CO K Level Questions 11 CO1 K1 11 12 CO2 K1 11 13 CO3 K2 11 14 CO4 K2 11 15 CO5 K2 15 Section C (Either/Or Type) Answer All Questions (5 x 5 = 25 ma) Q.No CO K Level Questions 16) a CO1 K2 16 17) a CO2 K3 11 18) b CO3 K3 11 19) a CO4 K3 11 19) b CO4 K3 11 19) b CO5 K3 11 19) b CO4 K3 11 19) b CO4 K3 12 20) b CO5 | 5 | CO3 | K1 | |
| 8 CO4 K2 9 CO5 K1 10 CO5 K2 Section B (Short Answers) Answer All Questions (5x2=10 mail) Q.No CO K Level Questions 11 CO1 K1 11 12 CO2 K1 11 13 CO3 K2 11 14 CO4 K2 11 15 CO5 K2 11 Section C (Either/Or Type) Answer All Questions (5 x 5 = 25 mail) Q.No CO K Level Questions 16) a CO1 K2 11 17) a CO2 K3 11 17) b CO2 K3 11 18) a CO3 K3 11 19) a CO4 K3 11 20) a CO5 K3 11 20) b CO5 K3 11 20) b CO5 K3 11 <th>6</th> <td>CO3</td> <td>K2</td> <td></td> | 6 | CO3 | K2 | |
| 9 CO5 K1 10 CO5 K2 Section B (Short Answers) Answer All Questions (5x2=10 mail Q.No CO K Level Questions 11 CO1 K1 11 12 CO2 K1 11 13 CO3 K2 11 14 CO4 K2 11 15 CO5 K2 11 Section C (Either/Or Type) Answer All Questions (5 x 5 = 25 mail) Q.No CO K Level Questions 16) a CO1 K2 11 17) b CO2 K3 11 17) b CO2 K3 11 18) a CO3 K3 11 19) b CO4 K3 12 20) a CO5 K3 12 20) b CO5 K3 12 20) b CO5 K3 | 7 | CO4 | K1 | |
| 10 CO5 K2 Section B (Short Answers) Answer All Questions Q.No CO K Level Questions 11 CO1 K1 12 12 CO2 K1 13 13 CO3 K2 14 14 CO4 K2 15 15 CO5 K2 15 Section C (Either/Or Type) Answer All Questions 16) a CO1 K2 17) b CO2 K3 17) b CO2 K3 18) a CO3 K3 19) a CO4 K3 20) a CO5 K3 20) b < | 8 | CO4 | K2 | |
| Section B (Short Answers)Answer All Questions $(5x2=10 \text{ mar})$ Q.NoCOK LevelQuestions11CO1K1112CO2K1113CO3K2114CO4K2115CO5K2Section C (Either/Or Type)Answer All QuestionsAnswer All Questions $(5 x 5 = 25 \text{ mar})$ Q.NoCOK LevelQuestions16) bCO1K2117) aCO2K3118) aCO3K3119) aCO4K3119) bCO4K3120) aCO5K31NB: Higher level of performance of the students is to be assessed by attempting high level of K levelsSection D (Open Choice)Answer Any Three questions(3x10=30 maQ.NoCOK LevelQuestions | 9 | CO5 | K1 | |
| Answer All Questions (5x2=10 markstyle Q.No CO K Level Questions 11 CO1 K1 12 CO2 K1 13 CO3 K2 14 CO4 K2 15 CO5 K2 Section C (Either/Or Type) Answer All Questions (5 x 5 = 25 markstyle Q.No CO K Level Questions 16) a CO1 K2 (5 x 5 = 25 markstyle Q.No CO K Level Questions 16) a CO1 K2 (5 x 5 = 25 markstyle 17) a CO2 K3 (5 x 5 = 25 markstyle 16) b CO1 K2 (5 x 5 = 25 markstyle 17) a CO2 K3 (5 x 5 = 25 markstyle 18) a CO3 K3 (5 x 5 = 25 markstyle 19) b CO4 K3 (5 x 5 = 25 markstyle 19) a CO4 K3 (5 x 5 = 25 markstyle 20) a CO5 K3 (5 x 5 = 25 | 10 | CO5 | K2 | |
| Q.No CO K Level Questions 11 CO1 K1 12 CO2 K1 13 CO3 K2 14 CO4 K2 15 CO5 K2 Section C (Either/Or Type) Answer All Questions (5 x 5 = 25 max) Q.No CO K Level Questions 16) a CO1 K2 (5 x 5 = 25 max) 16) a CO1 K2 (5 x 5 = 25 max) 16) a CO1 K2 (7) a 17) a CO2 K3 (7) b 17) a CO2 K3 (7) b 18) a CO3 K3 (7) b 18) a CO3 K3 (7) b 19) b CO4 K3 (7) b 20) a CO5 K3 (7) b 20) b CO5 K3 (7) b 20) b CO5 K3 (7) b 20) b CO5 K3 (7) c <th>Section</th> <th>B (Sho</th> <th>ort Answei</th> <th>rs)</th> | Section | B (Sho | ort Answei | rs) |
| 11 CO1 K1 12 CO2 K1 13 CO3 K2 14 CO4 K2 15 CO5 K2 Section C (Either/Or Type) Answer All Questions 16) a CO1 K2 16) b CO1 K2 17) a CO2 K3 17) b CO2 K3 18) a CO3 K3 18) b CO3 K3 19) b CO4 K3 20) a CO5 K3 20) b CO5 K3 Section D (Open Choice) Answer Any Three questions (3x10=30 ma Q.No CO K Level | Answe | r All Q | uestions | (5x2=10 marks) |
| 12 CO2 K1 13 CO3 K2 14 CO4 K2 15 CO5 K2 Section C (Either/Or Type) Answer All Questions (5 x 5 = 25 max Q.No CO K Level Questions 16) a CO1 K2 17) a CO2 K3 17) b CO2 K3 17) b CO2 K3 18) a CO3 K3 19) a CO4 K3 19) b CO4 K3 20) a CO5 K3 20) b CO5 K3 NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels Section D (Open Choice) Answer Any Three questions (3x10=30 max Q.No CO K Level Questions 21 C01 K2 | Q.No | CO | K Level | Questions |
| 13 CO3 K2 14 CO4 K2 15 CO5 K2 Section C (Either/Or Type) Answer All Questions (5 x 5 = 25 max Q.No CO K Level Questions 16) a CO1 K2 17) a CO2 K3 17) b CO2 K3 18) a CO3 K3 19) a CO4 K3 19) b CO4 K3 20) a CO5 K3 Questions is to be assessed by attempting high level of K levels Section D (Open Choice) Answer Any Three questions Questions 21 CO1 K2 | 11 | CO1 | K1 | |
| 14 $CO4$ $K2$ 15 $CO5$ $K2$ Section C (Either/Or Type)Answer All QuestionsQ.NoCOK LevelQ.NoCOK LevelQuestions(5 x 5 = 25 mar)16) aCO1K216) bCO1K217) aCO2K317) bCO2K318) aCO3K319) aCO4K320) aCO5K320) bCO5K320) bCO5K3NB: Higher level of performance of the students is to be assessed by attempting high level of K levelsSection D (Open Choice)Answer Any Three questions(3x10=30 maQ.NoCOK LevelQuestions21CO1K2 | 12 | CO2 | K1 | |
| 15 $CO5$ $K2$ Section C (Either/Or Type)Answer All QuestionsQ.NoCOK LevelQuestions16) aCO1K216) bCO1K217) aCO2K317) bCO2K318) aCO3K318) bCO3K319) aCO4K320) aCO5K320) bCO5K3NB: Higher level of performance of the students is to be assessed by attempting high level of K levelsSection D (Open Choice)Answer Any Three questions21CO1K2 | 13 | CO3 | K2 | |
| Section C (Either/Or Type)Answer All Questions $(5 x 5 = 25 mar)$ Q.NoCOK LevelQuestions16) aCO1K216) bCO1K217) aCO2K317) bCO2K318) aCO3K319) aCO4K320) aCO5K320) bCO5K3NB: Higher level of performance of the students is to be assessed by attempting higherlevel of K levelsSection D (Open Choice)Answer Any Three questions21CO1K2 | 14 | CO4 | K2 | |
| Answer All Questions (5 x 5 = 25 ma) Q.No CO K Level Questions 16) a CO1 K2 (16) b CO1 K2 16) b CO1 K2 (17) a CO2 K3 17) b CO2 K3 (17) b CO2 K3 17) b CO2 K3 (17) b CO2 K3 18) a CO3 K3 (17) b CO4 K3 19) a CO4 K3 (17) b CO4 K3 19) b CO4 K3 (17) b CO5 K3 20) a CO5 K3 (17) b (17) b <td< th=""><th>15</th><td>CO5</td><td>K2</td><td></td></td<> | 15 | CO5 | K2 | |
| Q.No CO K Level Questions 16) a CO1 K2 16) b CO1 K2 17) a CO2 K3 17) b CO2 K3 17) b CO2 K3 18) a CO3 K3 18) b CO3 K3 19) a CO4 K3 20) a CO5 K3 20) b CO5 K3 NB: Higher level of performance of the students is to be assessed by attempting high level of K levels Section D (Open Choice) Answer Any Three questions (3x10=30 ma Q.No CO K Level Questions 21 C01 | Section | C (Eit | her/Or Ty | pe) |
| 16) a CO1 K2 16) b CO1 K2 17) a CO2 K3 17) b CO2 K3 17) b CO2 K3 18) a CO3 K3 18) b CO3 K3 19) a CO4 K3 20) a CO5 K3 20) b CO5 K3 20) b CO5 K3 NB: Higher level of performance of the students is to be assessed by attempting highe level of K levels Section D (Open Choice) Answer Any Three questions (3x10=30 ma Q.No CO K Level Questions 21 CO1 | Answe | r All Q | uestions | (5 x 5 = 25 marks) |
| 16) b CO1 K2 17) a CO2 K3 17) b CO2 K3 17) b CO2 K3 17) b CO2 K3 18) a CO3 K3 18) b CO3 K3 19) a CO4 K3 19) b CO4 K3 20) a CO5 K3 20) b CO5 K3 20) b CO5 K3 NB: Higher level of performance of the students is to be assessed by attempting high level of K levels Section D (Open Choice) (3x10=30 ma) Answer Any Three questions (3x10=30 ma) 21 CO1 K2 | Q.No | CO | K Level | Questions |
| 17) a CO2 K3 17) b CO2 K3 18) a CO3 K3 18) b CO3 K3 19) a CO4 K3 19) b CO4 K3 20) a CO5 K3 20) b CO5 K3 20) b CO5 K3 20) b CO5 K3 NB: Higher level of performance of the students is to be assessed by attempting high level of K levels Section D (Open Choice) Answer Any Three questions (3x10=30 ma Q.No CO K Level Questions 21 C01 | / | | | |
| 17) b CO2 K3 18) a CO3 K3 18) b CO3 K3 19) a CO4 K3 19) b CO4 K3 20) a CO5 K3 20) b CO5 K3 20) b CO5 K3 20) b CO5 K3 NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels Section D (Open Choice) Answer Any Three questions (3x10=30 ma) Q.No CO K Level Questions 21 CO1 | | | | |
| 18) a CO3 K3 18) b CO3 K3 19) a CO4 K3 19) b CO4 K3 20) a CO5 K3 20) b CO5 K3 20) b CO5 K3 20) b CO5 K3 20) b CO5 K3 Section D (Open Choice) (3x10=30 ma) Answer Any Three questions (3x10=30 ma) Q.No CO K Level Questions 21 C01 | | | | |
| 18) b CO3 K3 19) a CO4 K3 19) b CO4 K3 20) a CO5 K3 20) b CO5 K3 20) b CO5 K3 20) b CO5 K3 NB: Higher level of performance of the students is to be assessed by attempting high level of K levels Section D (Open Choice) Answer Any Three questions (3x10=30 ma Q.No CO K Level Questions 21 C01 | 17) b | | | |
| 19) aCO4K319) bCO4K320) aCO5K320) bCO5K3NB: Higher level of performance of the students is to be assessed by attempting higher level of K levelsSection D (Open Choice)Answer Any Three questions(3x10=30 maQ.NoCOK LevelQuestions21CO1K2 | 18) a | | | |
| 19) bCO4K320) aCO5K320) bCO5K3NB: Higher level of performance of the students is to be assessed by attempting high level of K levelsSection D (Open Choice)Answer Any Three questions(3x10=30 maQ.NoCOK LevelQuestions21CO1K2 | | | | |
| 20) aCO5K320) bCO5K3NB: Higher level of performance of the students is to be assessed by attempting high level of K levelsSection D (Open Choice)Answer Any Three questions(3x10=30 maQ.NoCOK LevelQuestions21CO1K2 | , | | | |
| 20) bCO5K3NB: Higher level of performance of the students is to be assessed by attempting high level of K levelsSection D (Open Choice) Answer Any Three questions(3x10=30 maQ.NoCOK LevelQ.NoCOK LevelQ1CO1K2 | | | | |
| NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels Section D (Open Choice) Answer Any Three questions (3x10=30 ma) Q.No CO K Level Questions 21 CO1 K2 | | | | |
| level of K levels Section D (Open Choice) Answer Any Three questions (3x10=30 ma Q.No CO K Level Questions 21 CO1 K2 K | , | | | |
| Section D (Open Choice) Answer Any Three questions (3x10=30 ma) Q.No CO K Level Questions 21 CO1 K2 (3x10=30 ma) | | | | ormance of the students is to be assessed by attempting higher |
| Answer Any Three questions (3x10=30 ma) Q.No CO K Level Questions 21 CO1 K2 (3x10=30 ma) | | | | |
| Q.No CO K Level Questions 21 CO1 K2 | | | | |
| 21 CO1 K2 | | | | |
| | - | | | Questions |
| | | | | |
| 22 CO2 K3 | | | | |
| 23 CO3 K3 | | | | |
| 24 CO4 K4 | | | | |
| 25 CO5 K4 | 25 | CO5 | K4 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | | | | RACTICAL – I ualitative Analysis) |) | | | | | |
|--------------------|------------------|--------------|----------------|---------------------------------------|------|---------|---------------|-------|--------|--------------|
| Course Code | 21UCHCP1 | | \ | , | | | | L | Р | (|
| Category | Core | | | | | | | - | 2 | |
| ature of cours | e: EMPLOY | AB | ILITY 🗸 SI | KILL ORIENTED | ✓ | ENT | REPRENE | EUR | SHIP | \checkmark |
| Course Object | ives: | | | | 1 | 1 | | | | |
| • To Recall the | ne basic prope | rtie | s of salt mixt | ures. | | | | | | |
| • To Reminis | cence the anio | onic | and cationic | species in the salt n | nixt | ures. | | | | |
| • To Apply th | ne concept of a | anio | nic and catio | nic species in semi | mic | ro qua | alitative ana | lysis | 5. | |
| • To Execute | the confirmat | ion | test for the a | nions and cations pr | esei | nt in t | he salt mixt | ures. | | |
| • To Constru | ct four radicals | s wi | th correct pro | ocedure during analy | ysis | of the | e salt mixtu | res. | | |
| Duration o | f examination | n: 31 | hrs | | | | | | | |
| Ana | lysis of a mix | ture | containing t | two anions of which | n on | ie is a | n interferin | g in | semi- | |
| micro meth | od two cations | 5 | | | | | | | | |
| | | | | | | | | | | |
| Anions: | | | | | | | | | | |
| | - | | | ide, chloride, bromi | de, | iodide | e, oxalate, | | | |
| Bo | rate, phosphat | e ar | nd chromate. | | | | | | | |
| ſ | Aagnesium and | J a1 | <u>Distrib</u> | <u>ution of marks</u> x marks: 100 | | | | | | 3 |
| Internal | : 40 marks | 5 | | | | Ext | ternal : 60 |) mai | rks | |
| Laborator | / | : | 30 marks | Vivo voce | | : | 10 mark | | | |
| | on note book | : | 10 marks | Record note bool | k | : | 10 mark | S | | |
| | | | | Four radicals wit correct procedure | h | : | 40 mark | S | | |
| Total | | : | 40 marks | Total | | : | 60 mark | S | | |
| | | | | | | | | | | 30 |
| | | | | | | Т | otal Lectur | e Ho | ours | Hr |
| Books for Stu | dv: | | | | | | | | I | |
| l. Dr. V. V | • | | U | emimicro Qualitati | ve | Anal | ysis, Natio | nal | Publis | hir |
| ÷ , | | | | | | | | | | |
| Books for Ref | | | | | | | | | ~ ~ - | . |
| | book of Qual | itat | ive Analysis | including Semi Mi | cro | Meth | ods, Longn | nan S | Sc & 7 | lec |

| Web I | Resources: | |
|----------------|---|------------|
| 1. <u>httr</u> | os://www.youtube.com/watch?v=cEOvj6jkdDw | |
| 2. <u>httr</u> | os://www.youtube.com/watch?v=T3hi_xEpaDg | |
| 3. <u>httr</u> | <u>os://www.youtube.com/watch?v=BK7rf4XE4f8</u> | |
| 4. <u>httr</u> | os://www.youtube.com/watch?v=QQo1e-BUZWs | |
| Cours | e Outcomes: | K Level |
| On th | e completion of the course the student will be able to | |
| CO1: | Identify the basic radical and its group in the given salt mixture. | [Up to K2] |
| CO2: | Understand the qualitative analysis skill of any given inorganic salt mixture. | [Up to K3] |
| CO3: | Develop the acid radicals present in the given inorganic salt mixture. | [Up to K3] |
| CO4: | Analyze the basic radical systematically. | [Up to K4] |
| CO5: | Apply the four radicals with correct procedure during analysis of the salt mixtures | [Up to K4] |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | | | |
|-----------------|--------------------------|-------------|-------------|------|-------------|-------------|--|--|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | | | |
| CO5 | 2 | 3 | 1 | 3 | 2 | 1 | | | | |
| Weightage | 11 | 10 | 9 | 11 | 9 | 11 | | | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| UNIT | INORGANIC SEMI MICRO – QUALITATIVE ANALYSIS | Hrs | Mode |
|------|--|-----|-----------|
| Ι | Duration of examination: 3hrs Analysis of a mixture containing two anions of which one is an interfering in semi-micro method two cations Anions: Carbonate, sulphate, nitrate, fluoride, chloride, bromide, iodide, oxalate, Borate, phosphate and chromate. Cations: Lead, bismuth, copper, cadmium, antimony, iron (II and III), aluminium, Chromium, zinc, manganese, cobalt, nickel, barium, calcium, Magnesium and ammonium. | 30 | Practical |

Course Designed by: Dr. V. Ramasamy Raja & Dr. R. Satheesh



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | ALLIED PHYSICS- | I: (Mechanics, Properties | of Matter, Heat a | nd So | ound |) |
|-------------------|----------------------------|---|--------------------|-------------|-------------|-------|
| Course Code | 21UPHA11 | | | L | P | С |
| Category | Allied | | | 4 | - | 4 |
| Nature of cours | e: EMPLOYABILITY | ✓ SKILL ORIENTED | ✓ ENTREPREN | EURS | HIP | |
| Course Objecti | ives: | | | | | |
| The learners will | ll be able: | | | | | |
| | lect Newton's law of m | | | | | |
| | | perty and types of modulus | | | | |
| | • | application of Bernoulli's t | heorem | | | |
| | lect Kinetic theory of ga | | | | | |
| | rstand the concepts of S | .H.M | | | - [| |
| | chanics | | | | 13 | |
| 1 0 | | ent of Inertia –Perpendicu | | | | |
| | | lewton's laws of gravitation | | | Ear | th – |
| | | lum-Expression for period- | Experiment to find | " g" | | |
| | sticity | | | | 12 | |
| | - | t moduli of Elasticity-Poi | | - | | |
| | | mination of Young's modu | | | | |
| | | ple per unit twist-Work | | | Torsi | onal |
| | | isting- Rigidity modulus by | y torsion pendulum | 1 | 1.1 | |
| | cosity | D | 26: . : | f . | 11 | |
| | • | Poiseuille's formula - coef | • | | - | • |
| | _ | continuity-Bernoulli's theo | orem-derivation-A | ppiic | ation | s oi |
| | orem (Venturimeter and | | | | 10 | • |
| Unit: IV Hee | | | | | 12 | |
| | | h – Transport phenomena – | | | | |
| | | nductivity – Degrees of | | | | |
| | | Υ for mono atomic and d | | | | |
| | • | amics (statement only) – onversion of ice into stream | | or e | nuop | y III |
| Unit: V Sou | | onversion of ice into stream | 11 | | 12 | , |
| | | on of two S.H.M's of equa | al time periods at | right | | |
| - | - | tionary waves – Melde's | - | - | - | |
| | | nsverse and Longitudinal n | | | | |
| | | indt's tube and Piezoelectri | | | | |
| | netilou – Detection – Kt | | Total Lecture Ho | | 60 H | re |
| Books for Stud | v: | | | uis | JV 1 | 11.3 |
| | - | of Matter and Sound, Mad | lurai first | | | |
| 0 | 2016.[B.Sc.AncillaryPh | | iurai, 1115i | | | |
| - | Unit–I: 1.1, 2.1–2.7, 2.1 | - | | | | |
| | | | | | | |
| * (| Unit–II: 4.1-4.5, 4.7,4.8, | 4.10-4.13 | | | | |

| | * Unit–III: 5.2-5.7 - | |
|---------------|---|--------------------|
| | * Unit-V: 6.1, 6.3,6.4, 6.7-6.9, 6.12 | |
| 2 P N | Murugeshan, Thermal Physics, Madurai, First edition July, 2016. (B.Sc., Ancillar | v Dhysics) |
| 2. R N | | y Filysics) |
| | * Unit–IV: 6.1, 6.3-6.7, 6.9-6.11, 7.4-7.7 | |
| | for References: | 2011 |
| | Kakani, C.Hemarajani, S.Kakani, Mechanics , IIIedition, VivaBooks Ltd, NewDelhi | |
| | dayResnic,JearlWalker, PrinciplesofPhysics ,9 th Edition,WileyIndia Pvt.Ltd, New | Delni, |
| 2012. | | |
| | Mathur, Mechanics , S. ChandandCo., NewDelhi, 2008 | |
| | laland N.Subramanyam, Propertiesofmatter ,S.ChandandCo., New Delhi,2004 | 2004 |
| • | lalandN.Subramanyam,HeatandThermodynamics, S.Chandand Co, New Delhi, | 2004. |
| | esources: | |
| | tps://latestcontents.com/bsc-physics-mechanics-notes/ | |
| | ww.khanacademy.org/science/physics/elasticity/surface_tension | |
| | tps://www.askiitians.com/revision-notes/physics/kinetic-theory-of-gases/ | |
| | tps://www.askiitians.com/revision-notes/physics/thermodynamics/ | |
| | Outcomes | K Level |
| After su | uccessful completion of the course, the student is expected to | |
| | Understand the concepts of Newton's law of Gravitation, different modulus of | |
| CO1: | elasticity, mean free path, degrees of freedom, laws of thermodynamics and | K2 |
| | stationary waves | |
| | Define centripetal and centrifugal force, angular velocity, moment of inertia, | |
| CO2: | elasticity, Poisson's ratio, bending of beams, Bernouli's theorem, Transport | K3 |
| | Phenomena, mono and diatomic gases, S.H.M, properties of Ultrasonic waves | |
| | Apply torque, angular momentum, expression for bending moment, couple per | |
| CO3: | unit twist, Bernouli's theorem, Boltzmann's law of equipartition of energy, | K3 |
| 005: | change of entropy in conversion of ice to steam, applications of Ultrasonic | КJ |
| | waves | |
| | Analyze parallel and perpendicular axis theorem, Boy's method for G, | |
| CO4: | determine and analyze uniform and non-uniform bending, Poiseuille's | K4 |
| | formula to find the coefficient viscosity of liquid | |
| | | |
| | Analyze the change of entropy in Carnot's cycle, Kundt's tube and Piezo | |
| CO5: | Analyze the change of entropy in Carnot's cycle, Kundt's tube and Piezo electric method for the production of Ultrasonic waves, Melde's experiment | K4 |

CO & PO Mapping:

| COS | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
|------|------|------|------|------|------|------|
| CO 1 | 3 | 2 | 2 | 2 | 2 | 2 |
| CO 2 | 3 | 2 | 1 | 2 | 2 | 2 |
| CO 3 | 3 | 2 | 2 | 2 | 2 | 2 |
| CO 4 | 3 | 2 | 2 | 1 | 2 | 2 |
| CO 5 | 2 | 2 | 1 | 1 | 2 | 2 |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| Unit | ALLIEDPHYSICS–I Mechanics, Properties of Matter, Heat and Sound | Hrs | Pedagogy |
|------|--|-----|--|
| I | Mechanics Torque – Angular momentum –Moment of Inertia –Perpendicular and Parallel axes theorem - Kepler'slawsofplanetarymotion- Newton'slawsofgravitation–Massanddensityof Earth–Boy's method for G–Compound pendulum-Expression for period- Experiment to find "g" | 13 | Lecture method, PPT, Demonstration |
| п | Elasticity Different moduli of Elasticity-Poisson'sratio–Bendingofbeams– Expression for bending moment–Determination of Young's modulus by uniform and non uniform bending – Torsion– Expression for couple per unit twist – Workdone in twisting Torsional oscillations of a body - Workdone in twisting– Rigidity modulus by torsion pendulum | 12 | Lecture method, PPT, Demonstration |
| ш | Viscosity Viscosity - Derivation of Poiseuille's formula - coefficient of viscosity of a liquid by Poiseuille's method – Equation of continuity - Bernoulli's theorem – derivation – Applications of Bernoulli's theorem (Venturimeter and Pitot tube) | 11 | Lecture method, PPT, Model |
| IV | Heat Kinetic theory of gases – Mean free path – Transport phenomena – Expression for the coefficient of Diffusion, viscosity and thermal conductivity – Degree of freedom – Boltzman's law of equipartition of energy – calculation of Υ for mono atomic and diatomic gases - Thermodynamics – First and second laws of thermodynamics (statement only) – Entropy – change of entropy in Carnot's cycle – Change of entropy in conversion of ice into stream | 12 | Lecture method, PPT |
| V | Sound Simple harmonic motion Composition of two S.H.M's of equal time periods at right angles - Stationary wavesProperties of stationary waves Melde's experiment for the frequency of electrically maintained tuning fork (Ttransverse and Longitudinal modes) - Ultrasonics Production Piezo electric method Detection Kundt's tube and Piezo electric Properties Applications | 12 | Lecture method, PPT |

Course Designed by: 1. Mrs.A.Lakshmi, 2. Dr.S.S.Jayabalakrishnan

| | Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs) | | | | | | | | | | | | |
|-----------------------|--|------------------------------------|-----------------------------------|----------------------------|------------------|-------------------------------------|------------------------|-----------------------------|--------------|-----------------------------|--------------------------|--|-----------------|
| Inter | | К- | К- | | | Secti | | Secti | | Secti (Eith | ion C ner or pice) | | on D Choice) |
| Inter nal | COs | Le vel | vel | MC No. of. Questions | CQs K - Level | Short A No. of. Questio ns | nswers K - Level | No. of. Quest ions | K - Level | No. of. Quest ions | K - Level | | |
| CI | CO1 | K1 | Ι | 2 | K1 & K2 | 1 | K1 | 2 | K2 | 1 | K2 | | |
| AI | to CO5 | to K4 | II | 2 | K1 & K2 | 2 | K2 | 2 | K3 | 2 | K3 | | |
| СІ | CO1 | K1 | III | 2 | K1 & K2 | 1 | K2 | 2 | K3 | 1 | K3 | | |
| AII | to CO5 | to K4 | IV | 2 | K1 & K2 | 2 | K2 | 2 | K4 | 2 | K4 | | |
| | | No. of Questions to be asked | | 4 | | 3 | | | 4 | | 3 | | |
| ~ | Question | | o. of estions o be wered | 4 | | 3 | | | 2 | | 2 | | |
| Pattern CIA I & II | | e | ks for ach estion | 1 | | 2 | | 5 | | 1 | 10 | | |
| | | | otal ks for ach ction | 4 | | 6 | | 1 | 0 | 2 | 0 | | |

| | | Dist | ribution of I | Marks with | K Level C | IA I & 0 | CIA II | | |
|-----|------------|--|---|---|-------------------------------|----------------|--------------------------------------|---------------------|--|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % | |
| | K1 | 2 | 2 | | | 4 | 6.7 | 50 | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 43.3 | 50 | |
| CIA | K3 | | | 10 | 20 | 30 | 50.0 | 50 | |
| | K4 | | | | | | | - | |
| I | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 | |
| | K1 | 2 | 2 | | | 4 | 6.7 | 167 | |
| | K2 | 2 | 4 | | | 6 | 10.0 | 16.7 | |
| CIA | K3 | | | 10 | 10 | 20 | 33.3 | 33.3 | |
| II | K4 | | | 10 | 20 | 30 | 50.0 | 50 | |
| | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 | |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

| Summ | ative Ex | aminatio | on – Blu | e Print A | rticulati | on Mapp | ing – K l | Level wit | h Course | e Outcom | es (COs) |
|--------|-----------------|----------------|----------|------------------------|--------------|------------------------|--------------|--------------------------------------|--------------|----------------------------|--------------|
| C No | COr | К - | vel | MOQs | | Short Answers | | Section C (Either / or Choice) | | Section D (Open Choice) | |
| S.No. | COs | Level | | No.of Ques tions | K – Level | No.of Quest ions | K – Level | No.of Quest ions | K – Level | No.of Quest ions | K – Level |
| 1 | CO1 - CO5 | K1 to K4 | Ι | 2 | K1 & K2 | 1 | K1 | 2 | K2 & K2 | 1 | K2 |
| 2 | CO1 - CO5 | K1 to K4 | Π | 2 | K1 & K2 | 1 | K1 | 2 | K3 & K3 | 1 | K3 |
| 3 | CO1 - CO5 | K1 to K4 | III | 2 | K1 & K2 | 1 | K2 | 2 | K3 & K3 | 1 | K3 |
| 4 | CO1 - CO5 | K1 to K4 | IV | 2 | K1 &K2 | 1 | K2 | 2 | K4 & K4 | 1 | K4 |
| 5 | CO1 - CO5 | K1 to K4 | v | 2 | K1 & K2 | 1 | K2 | 2 | K4 & K4 | 1 | K4 |
| No. of | Questio | ns to be A | Asked | 10 | | 5 | | 1 | 0 | | 5 |
| | - | stions to | | 10 | | 5 | | 4 | 5 | | 3 |
| Mai | ks for ea | ach questi | ion | 1 | | 2 | | 5 | | | 10 |
| Total | Marks fo | or each se | ction | 10 | | 10 | | 2 | 5 | | 30 |

<u>UNIT-V</u> will be allotted for individual Assignment in <u>CO5 - K4</u> level which carries five marks as part of CIA component.

| | | D | istribution of | Marks with | K Level | | | |
|------------|---|---|-------------------------------------|--------------------------------|----------------|--------------------------------------|-------------------|--|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % | |
| K1 | 5 | 4 | | | 9 | 12 | 47 | |
| K2 | 5 | 6 | 10 | 10 | 31 | 34.66 | 47 | |
| K3 | | | 20 | 20 | 40 | 27 | 27 | |
| K4 | | | 20 | 20 | 40 | 26.66 | 26 | |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 | |
| | NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels. | | | | | | | |

| Section | A (Mu | ltiple Cho | ice Questions) |
|----------|-----------|------------|--|
| Answer | All Q | uestions | (10x1=10 marks) |
| Q.No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| Section | B (Sho | ort Answei | rs) |
| Answer | : All Q | uestions | (5x2=10 marks) |
| Q.No | CO | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| Section | C (Eit | her/Or Ty | pe) |
| Answer | : All Q | uestions | (5 x 5 = 25 marks) |
| Q.No | CO | K Level | Questions |
| 16) a | CO1 | K2 | |
| 16) b | CO1 | K2 | |
| 17) a | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K4 | |
| 19) b | CO4 | K4 | |
| 20) a | CO5 | K4 | |
| 20) b | CO5 | K4 | |
| | | | ormance of the students is to be assessed by attempting higher |
| level of | | | |
| | | en Choice | |
| | | Three ques | |
| Q.No | <u>CO</u> | K Level | Questions |
| 21 | CO1 | K2 | |
| 22 | CO2 | K3 | |
| 23 | CO3 | K3 | |
| 24 | CO4 | K4 | |
| 25 | CO5 | K4 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | ALLIED PHYSICS PRACTICAL - I | | | | | | | | | |
|----------------------------------|------------------------------|----------------------------|--|------------|--------|----|--|--|--|--|
| Course Code | 21UPHAP1 | | | L | Р | С | | | | |
| Category | Allied | | | - | 2 | - | | | | |
| Nature of cours | se:EMPLOYABILITY | ✓ SKILL ORIENTED | ✓ ENTREPREN | EURS | HIP | | | | | |
| Course Object | ives: | | | | | _ | | | | |
| The learners will be able: | | | | | | | | | | |
| Ū. | 0 | ents based on Optics, Elec | ctricity and Electro | onics | | | | | | |
| | ate modulus of elasticity | | 0 | | | | | | | |
| | | orward and reverse biasin | g, frequency respon | nce | | | | | | |
| | d current conduction in e | | 1. 6. | | | | | | | |
| | * | cillator and Operational a | | | | | | | | |
| | | S (Any Fourteen Experime | , | | | | | | | |
| 1 Uniform ben 2. Torsion Pend | | - (Pin & Micr | 1 / | 1 | 1 | r | | | | |
| | | | on of Rigidity mod | ulus ar | na M.I | | | | | |
| | ductivity of Bad conduct | | 6.1 | | | | | | | |
| 4. Sonometer | | - Verification | | | | | | | | |
| | f low range Voltmeter | - Potentiomet | | • | | | | | | |
| 6. Carey Foster | 0 | | & resistivity of a w ndexof a Prism | ire. | | | | | | |
| 7. Spectrometer | | | | | | | | | | |
| 8Mirror Galva | | | current sensitiven | ess | | | | | | |
| 9.LCR – Series | resonance | | on of L & Q factor | | | | | | | |
| 10.Air wedge | A NT 1 · · 1 | - Thickness of | | | | | | | | |
| <u> </u> | λ Normal incidence | - Spectrometer | • | | | | | | | |
| | transistor amplifier | - CE mode | 6.6 | | | | | | | |
| 13.Hartley oscil | | - Determinatio | | | | | | | | |
| | – NAND and NOR | | ete Components. | , . | | | | | | |
| 15.Zener diode | | | everse Characteris | tics | | | | | | |
| 16.OP AMP | | - Adder and Su | | | 20.77 | | | | | |
| | | | Total Practical H | ours | 30 H | rs | | | | |
| Books for Stud | ly: | | | | | | | | | |

2. Srinivasan.M.N.,Balasubramanian.S.,Ranganathan.R., A Text Book of Practical Physics, 2017 Edition Sultan Chand & Sons

Books for References:

- 1. Ouseph.C., Practical Physics and Electronics, 2013.S. Viswanathan.P.Ltd
- **2.** Practical Physics and Electronics, C.C.Ouseph, U.J.Rao, V.Vijayendran, S.Viswanathan Publishers(2007)

Web Resources:

- 1. https://nptel.ac.in/course.html/physics/experimental physics I, II and III
- 2. <u>https://nptel.ac.in/courses/115/105/115105110/</u>
- 3. <u>https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-rZn_LgLofRX7n8z4tHYK</u>

| Course | Course Outcomes | | | | | |
|-------------|--|------------|--|--|--|--|
| On suc | On successful completion of the course, the learners should be able to | | | | | |
| | Understand and evaluate the Young's modulus and Rigidity modulus of the | | | | | |
| CO1: | given material, the ways to calibrate a low range voltmeter using | K4 | | | | |
| | potentiometer | | | | | |
| CO2: | Acquire the knowledge of the characteristics of an operational amplifier | K3 | | | | |
| CO3: | Apply the basic principles of optics to determine the thickness of a wire | K4 | | | | |
| CO4: | Analyze the electrical parameters like resistance and resistivity using Carrey | K4 | | | | |
| C04: | Foster bridge and characteristics of Zener diode | N 4 | | | | |
| CO5: | Construct Amplifier and Oscillator | K4 | | | | |

CO & PO Mapping:

| COS | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
|------|------|------|------|------|------|-------------|
| CO 1 | 3 | 2 | 3 | 3 | 3 | 2 |
| CO 2 | 2 | 2 | 2 | 2 | 5 | 2 |
| CO 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO 4 | 3 | 3 | 3 | 3 | 3 | 2 |
| CO 5 | 3 | 2 | 2 | 3 | 3 | 3 |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| Semester | Allied Physics Practical - I | Hrs | Pedagogy |
|----------|---|-----|---------------|
| | 1. Uniform bending - Pin & Microscope | | |
| Ι | 2. Torsion Pendulum - Determination of Rigidity modulus and | | |
| | M.I | | |
| | 3. Thermal conductivity of Bad conductor - Lee's disc | | |
| | 4. Sonometer - Verification of laws | | Demonstration |
| | 5. Calibration of low range Voltmeter - Potentiometer | | |
| | 6. LCR – Series resonance - Determination of L & Q factor | | |
| | 7. Logic gates – NAND and NOR - (Discrete Components). | | |
| | 8. Zener diode - Forward & Reverse Characteristics | | |

Course Designed by: 1. Mrs.A.Lakshmi, 2. Dr.R.Sangeetha



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | COSMETIC CHEMISTRY | | | |
|---|--|--|--|--------------------------|
| Course Code | 21UCHS11 | L | Р | С |
| Category | Skill | 2 | - | 2 |
| Nature of cours | e: EMPLOYABILITY 🗸 SKILL ORIENTED 🗸 ENTREPREN | NEUF | SHIP | • |
| Course Objecti | ves: | | | |
| • To Remember $To Compare To Compare To Execute To Determine To Determine To Dental Preparat (Composition of Soap. Problems Unit: II CO$ | he basic properties of soap and detergents and also ingredients on too ber the preparations of hair care products. It the consumer products with their compositions. The composition and physical properties of milk products. In the adulterants in food materials and first aid and antidots for pois SMETICS I ions: Tooth pastes- ingredients, their characteristics and functions. Inly). Soap and Detergents: Manufacture of Soap and Detergents. Cle of Detergents as waste water in water resources. SMETICS II ations: shampoo; different types and formulations, Moisturizing creating the state of the state | oned Mou ansing | person 0 th was g actio | 96 shes n of 96 |
| | ng creams, after shave preparations. (Composition and applications f | | | |
| | NSUMER PRODUCTS | | | 6 |
| | ucts: Composition and Uses of Safety Matches, Agarbattis, Naphtha lish, Gum, Ink, Chalk crayons. | lene E | Balls, V | Nax |
| | GAR | | 0 | 6 |
| alcohol from mo – power alcohol | | | ated s | pirit |
| | OD ADULTERATION | | - | 6 |
| and toxic chem | 1 | natura J). Fii | al pois st aid | sons and |
| Books for Stud | Total Lecture | Hour | 5 30 | Hrs |
| Sharma, B.I Poucher, W Chemistry a K.S. Rangaj 1975. Chopra H.K Books for Refer R.V.Shreve, Mumbai. Mohan Mal | K., Industrial Chemistry, Meerut: GOEL Publishing House, 1st Editio A. Perfumes, Cosmetics and soaps, Vol. III, Modern Cosmetics. Sin and the beauty business, 2018. Opa and K.T Acharya, Indian Dairy products, Asia Publishing House A. Panesar, P.S, "Food Chemistry" Narosa Publishing House, New Do | nons, , , New <u>elhi, 2</u> y, 200 | J.V. ⁷ Delhi <u>010.</u>)5, | |
| | uncil Meeting Held On 29.04.2021 |] | Page 18 | 8 |

| Web R | esources: | |
|----------------|--|------------|
| | os://bit.ly/3rVPCex | |
| 2. <u>httr</u> | os://bit.ly/380FFI8 | |
| Course | e Outcomes: | K Level |
| On th | e completion of the course the student will be able to | |
| CO1: | Relate the characteristics of tooth pastes, hair care products. | [Up to K2] |
| CO2: | Understand the concepts of manufacture of soaps, detergents, hair care and | [Up to K3] |
| CO2. | consumer products. | |
| CO3: | Compare the milk and sugar products on their composition. | [Up to K3] |
| CO4: | Correlate the consumer products, sugar and food adulteration. | [Up to K4] |
| CO5: | Construct the characteristics and understand the consumer products | [Up to K4] |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | |
|-----------------|--------------------------|-------------|-------------|------|-------------|-------------|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | |
| CO5 | 2 | 3 | 1 | 3 | 2 | 1 | |
| Weightage | 11 | 10 | 9 | 11 | 9 | 11 | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| UNIT | COSMETIC CHEMISTRY | Hrs | Mode |
|------|---|-----|---------------------------------|
| I | COSMETICS I Dental Preparations: Tooth pastes- ingredients, their characteristics and functions. Mouth washes (Composition only). Soap and Detergents: Manufacture of Soap and Detergents. Cleansing action of Soap. Problems of Detergents as waste water in water resources. | 06 | Chalk & Talk, Power Point |
| Ш | COSMETICS II Hair care preparations: shampoo; different types and formulations, Moisturizing creams, perfumes, Lip sticks, shaving creams, after shave preparations. (Composition and applications for the above). | 06 | Chalk & Talk, Power Point |
| Ш | CONSUMER PRODUCTS Consumer Products: Composition and Uses of Safety Matches, Agarbattis, Naphthalene Balls, Wax candles, shoe polish, Gum, Ink, Chalk crayons. | 06 | Chalk & Talk, Power Point |
| IV | SUGAR Preparation of bagasse-use of bagasse for the manufacture of paper and electricity- preparation of alcohol from molasses-preparation of absolute alcohol-manufacture of wine, beer, methylated spirit – power alcohol. | 06 | Chalk & Talk, Power Point |
| V | FOOD ADULTERATION Food adulteration - Contamination of wheat, rice, dhal, milk, butter, with clay, sand, stone, water and toxic chemicals (e.g., Kasseri dhal with mentanil yellow). Food poisons: natural poisons (alkaloids, nephrotoxins), pesticides (DDT, BHC, Follidol), chemical poisons (KCN). First aid and Antidotes for poisoned persons. | 06 | Chalk & Talk, Power Point |

Course Designed by: Dr. J.E. Sangeetha & Dr. R. Satheesh



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | GREEN CHEMISTRY | | | | | | |
|---|--|-------------------------------|-----------------------|---------------------|--------|-------------|--|
| Course Code | 21UCHS12 | | | L | Р | С | |
| Category | Skill | | | 2 | - | 2 | |
| Nature of Cours | e: EMPLOYABILITY | ✓ SKILL ORIENTED | ✓ ENTREPRE | NEUR | SHIP | • | |
| Course Objecti | ves: | | | | | | |
| To Reco | llect the green environment | nt and basic definition for g | green chemistry. | | | | |
| To Rem | ember the twelve principle | es of green chemistry and e | xamples. | | | | |
| • To Compare the concept of yield and its calculation on atom economy. | | | | | | | |
| To Exec | ute the concept of selectiv | ity, types of selectivity and | reactions using gr | een so | lvent | s. | |
| To Deter | mine the basic concepts in | n designing green synthesis | and choice of star | ting n | nateri | als. | |
| | RODUCTION | | | | | б | |
| | - | Green Chemistry- Goals o | - | | | | |
| | Green chemistry, Progress | of Green Chemistry- Twe | elve principles of C | Breen | Chen | nistry | |
| and Examples. | | | | | | | |
| | LD AND ATOM ECON | | | | | 6 | |
| | | om economy – Definition, | Calculation of At | om e | conor | ny in | |
| · · · · | addition, substitution and | | | | | - | |
| Unit: IIISELECTIVITY IN GREEN CHEMISTRYConcept of selectivity, Types of selectivity -Chemo-, regio-, enantio- and diast | | | | | | <u>6</u> | |
| | | | | | | | |
| | | critical CO_2 - Cleaner te | | \mathbf{J}_2 .10n | ic liq | uids- | |
| | LVENT FREE REACTI | els- Alder reaction. and wat | er. | | | 6 | |
| | | eactions, rearrangements & | mhotochemical rea | otion | | | |
| | | nic-Advantages of MW tec | | | | | |
| reduction & rea | - | ine-Auvantages of Mive tee | iniques. Reaction | 5 IIKC | UNIU | ation, | |
| | SIGNING OF GREEN S | YNTHESIS | | | | 6 | |
| | | esis - choice of starting ma | terials, reagents, ca | atalysi | | - | |
| | en chemistry and solvents | | , | ·····j~· | | <u>j</u> | |
| | 2 | 1 | Total Lecture Ho | ours | 30 | Hrs | |
| Books for Stud | y: | | | | | | |
| 1. V. Kumar, "A | n Introduction to Green C | Chemistry" Vishal publishir | ng Co. Reprint Edit | tion 20 | 010 | | |
| 2. Rashmi Sang | ni, M.M Srivastava "Gree | n Chemistry" Fourth Reprin | nt - 2009 | | | | |
| Books for Refe | rences: | | | | | | |
| | | ew Trends in Green Chemis | • | | | | |
| | s, and J.K. Warner: Green | n Chemistry - Theory and | Practical, Oxford U | Jnive | sity I | Press, | |
| 1998. | | | | | | | |
| Web Resources | | | | | | | |
| | youtube.com/watch?v=F | | | | | | |
| | <u>youtube.com/watch?v=q</u> | <u>INIT W-11909g</u> | | | ΖΙ | | |
| Course Outcon | | dant will be able to | | | K Lev | vei | |
| | tion of the course the stu the twelve principles of C | | | гт | In to | K 21 | |
| | the twelve principles of C | neen Chennsu y. | | ונ | p to | 184] | |
| Academic (| Council Meeting Held On 2 | 9.04.2021 | | Pa | age 21 | | |

| CO2: | Understand the need for green chemistry and goals of Green Chemistry. | [Up to K3] |
|-------------|--|------------|
| CO3: | Apply Green Chemistry principles to organic synthesis. | [Up to K3] |
| CO4: | Analyze the uses of Microwave and ultrasonic radiations to carry our reaction. | [Up to K4] |
| CO5: | Construct the basic concepts and twelve principles of Green Chemistry in designing green synthesis | [Up to K4] |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | |
|------------------------|--------------------------|-------------|------|------|-------------|------|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | |
| CO 1 | 2 | 1 | 2 | 3 | 3 | 2 | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | |
| CO 3 | 2 | 2 | 3 | 2 | 2 | 3 | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | |
| CO5 | 2 | 3 | 1 | 3 | 2 | 1 | |
| Weightage | 10 | 10 | 9 | 11 | 10 | 11 | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| UNIT | GREEN CHEMISTRY | Hrs | Mode |
|------|---|-----|------------------------------------|
| I | INTRODUCTION Definition for Green Chemistry, Need for Green Chemistry- Goals of Green Chemistry – Obstacles and Advantages of Green chemistry, Progress of Green Chemistry- Twelve principles of Green Chemistry and Examples. | 06 | Chalk & Talk, Power Point |
| П | YIELD AND ATOM ECONOMY Concept of Yield and its calculation, Atom economy – Definition, Calculation of Atom economy in rearrangement, addition, substitution and elimination reactions. | 06 | Chalk & Talk, Power Point |
| III | SELECTIVITY IN GREEN CHEMISTRY Concept of selectivity, Types of selectivity -Chemo-, regio-, enantio- and diastereoselectivities, Reactions using Green solvents - Super critical CO ₂ - Cleaner technology with CO ₂ .Ionic liquids-Friedel-crafts reaction, halogenation &Diels- Alder reaction. and water. | 06 | Chalk & Talk, Power Point |
| IV | SOLVENT FREE REACTIONS Organic synthesis in solid state-Thermal reactions, rearrangements &photochemical reactions. Mode of supplying energy-microwave and ultrasonic-Advantages of MW techniques. Reactions like oxidation, reduction & rearrangements. | 06 | Chalk & Talk, Power Point |
| V | DESIGNING OF GREEN SYNTHESIS Basic concepts in designing Green synthesis - choice of starting materials, reagents, catalysts-catalytic approach in green chemistry and solvents with suitable examples. | 06 | Chalk & Talk, Power Point |





MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | ORGANIC CHEMIS | TRY | - I | | | | | |
|--|---|-----|--------------------|------------------|---------|-------|-----|--|
| Course Code | 21UCHC21 | | | | L | Р | С | |
| Category | Core | | | | 4 | - | 4 | |
| Nature of course | : EMPLOYABILITY | ✓ | SKILL ORIENTED | ENTREPRE | INEUI | RSHIP | ✓ | |
| Course Objecti | ves: | | | | | | I | |
| To Underst and carboxy To Classify To Execute | To Understand the preparation, properties of hydrocarbons, alcohols, ethers, aldehydes, ketones and carboxylic acids. | | | | | | | |
| • To Constr polysacchai | uct the preparation a ides. | ana | properties of mono | saccharides, dis | saccina | nues | and | |
| 1 4 | DROCARBONS | | | | | 1 | 12 | |
| HydrocarbonsIntroductionDefinition and Classifications.AlkanesNomenclatureGeneralmethods of preparation and Chemical properties.AlkenesNomenclatureGeneral methods ofpreparation– chemical properties– Electrophilic additions– Addition of hydrogen halide–Markownikov's rule– Antimarkovinkov's addition– Addition of H2SO4, H2O, Halogen–Hydroboration– oxidation– ozonolysis– hydroxylation– polymerization.Alkynes- Generalmethods of preparation– physical and chemical properties– polymerization.12Unit: IIALCOHOLS, ETHERS, THIOALCOHOLS AND THIOETHERS12Alcohols:Preparation by hydroboration; reduction of carbonyl compounds, acids and esters, by12using Grignard reagents.Reaction with metals.Mechanism and reactivity towards HX, dehydration– rearrangement.Ascending and descending the alcohol series– estimation of number of hydroxylgroups.Ethers:Mechanism of Williamson's synthesis, mechanism of cleavage by HX, estimationof methoxygroup by Zeisel method.Application of crown ethers.Thioalcohols and thioethers:Preparation and properties of sulphonal and mustard gas.Preparation of sulphonal and mustard gas.Preparation | | | | | | | | |
| Unit: IIIALDEHYDES, KETONES AND CARBOXYLIC ACIDS12Aldehydesand Ketones: Nomenclature and structure of carbonyl group – Preparation of Aldehydes and Ketones.Aldehydesand Ketones: – Physical properties – Chemical reactions and uses of Aldehydes and Ketones.Carboxylic Acids: Nomenclature and structure of carboxyl group – Methods of preparation of Carboxylic acids – Physical properties – Chemical reactions and uses of Carboxylic acids.I2Unit: IVSTEREO ISOMERISM12Geometrical isomerism: Definition – geometrical isomerism of maleic and fumaric acids – aldoximes – determination of configuration of geometric isomers – E, Z notations – stereo chemistry of addition of bromine to double bond. Optical isomerism: Optical activity – specific rotation – definition of optical isomerism – elements of symmetry - Optical isomerism of compounds containing asymmetric carbon atom – racemization and resolution of racemic mixtures – Walden inversion – asymmetric synthesis – chirality – specifications of absolute configuration by R and S notations. Optical activity of compounds without asymmetric carbon atoms, allenes, spiranes and bi phenyl compounds. | | | | | | | | |
| Unit: V Car | bohydrates: | | | | | 1 | 12 | |

Definition – classification – monosaccharides – properties and uses of glucose and fructose – configuration of glucose and fructose – Haworth structure – conversion of glucose to fructose and vice versa. **Disaccharides**: Preparation, properties, constitution and configuration of sucrose. **Poly saccharides**: A general study of starch and cellulose – uses of cellulose in industries.

Total Lecture Hours 60 Hrs

Books for Study:

1. B. S Bahl and Arun Bahl S.Chand, Advanced Organic Chemistry Co Ltd, New Delhi, 2012.

Books for References:

- 1. B-Mehta and M.Mehta, Organic Chemistry E.E Edition, New Delhi, 2010.
- 2. P.L Soni and H.M Chawla, Organic Chemistry, 29th Edition, Sultan Chand and sons, New Delhi, 2007.

Web Resources:

Course Outcomes:

- 1. https://courses.lumenlearning.com/chemistryformajors/chapter/alcohols-and-ethers/
- 2. <u>https://www.youtube.com/watch?v=_vq9T0htW0Y</u>
- 3. <u>https://courses.lumenlearning.com/chemistryformajors/chapter/aldehydes-ketones-</u> <u>carboxylic-acids-and-esters-2/</u>
- 4. https://www.youtube.com/watch?v=JxK5rZxbyQY

K Level

| On th | e completion of the course the student will be able to | |
|-------------|--|------------|
| CO1: | Identify the basic idea of organic compounds and carbohydrates. | [Up to K2] |
| CO2: | Classify the hydrocarbons, alcohols, ethers and carbohydrates. | [Up to K3] |
| CO3: | Determine the preparation of hydrocarbons, alcohols, ethers and the given carbonyl compounds. | [Up to K3] |
| CO4: | Analyze the physical and chemical properties of hydrocarbons, alcohols, ethers and the given carbonyl compounds. | [Up to K4] |
| CO5: | Construct the basic idea of preparation, properties of organic compounds and carbohydrates. | [Up to K4] |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | | | |
|------------------------|--------------------------|------|------|------|------|-------------|--|--|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | | | |
| CO5 | 2 | 3 | 1 | 3 | 2 | 1 | | | | |
| Weightage | 11 | 10 | 9 | 11 | 9 | 11 | | | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| UNIT | ORGANIC CHEMISTRY – I | Hrs | Mode |
|------|--|-----|---------------------------------------|
| Ι | HYDROCARBONS Hydrocarbons – Introduction – Definition and Classifications. Alkanes – Nomenclature - General methods of preparation and Chemical properties. Alkenes – Nomenclature – General methods of preparation – chemical properties – Electrophilic additions – Addition of hydrogen halide – Markownikov's rule – Antimarkovinkov's addition – Addition of H₂SO₄, H₂O, Halogen – Hydroboration – oxidation – ozonolysis – hydroxylation – polymerization. Alkynes – Nomenclature – General methods of preparation – physical and chemical properties – polymerization. | 12 | Chalk & Talk, Power Point |
| II | ALCOHOLS, ETHERS, THIOALCOHOLS AND THIOETHERS Alcohols: Preparation by hydroboration; reduction of carbonyl compounds, acids and esters, by using Grignard reagents. Reaction with metals. Mechanism and reactivity towards HX, dehydration – rearrangement. Ascending and descending the alcohol series – estimation of number of hydroxyl groups. Ethers: Mechanism of Williamson's synthesis, mechanism of cleavage by HX, estimation of methoxy group by Zeisel method. Application of crown ethers. Thioalcohols and thioethers: Preparation and properties of sulphonal and mustdard gas. | 12 | Chalk & Talk, Power Point |
| III | ALDEHYDES, KETONES AND CARBOXYLIC ACIDS Aldehydes and Ketones: Nomenclature and structure of carbonyl group – Preparation of Aldehydes and Ketones – Physical properties – Chemical reactions and uses of Aldehydes and Ketones. Carboxylic Acids: Nomenclature and structure of carboxyl group – Methods of preparation of Carboxylic acids – Physical properties – Chemical reactions and uses of Carboxylic acids. | 12 | Chalk & Talk, Power Point |
| IV | STEREO ISOMERISMGeometrical isomerism: Definition – geometrical isomerism of maleicand fumaric acids – aldoximes and ketoximes – determination ofconfiguration of geometric isomers – E, Z notations – stereo chemistry ofaddition of bromine to double bond. Optical isomerism: Optical activity –specific rotation – definition of optical isomerism – elements of symmetry- Optical isomerism of compounds containing asymmetric carbon atom –racemization and resolution of racemic mixtures – Walden inversion –asymmetric synthesis – chirality – specifications of absolute configurationby R and S notations. Optical activity of compounds without asymmetric | 12 | Chalk & Talk, Power Point |

| | carbon atoms, allenes, spiranes and bi phenyl compounds. | | |
|---|--|----|---------------------------------------|
| V | Carbohydrates : Definition – classification – monosaccharides – properties and uses of glucose and fructose – configuration of glucose and fructose – Haworth structure – conversion of glucose to fructose and vice versa. Disaccharides : Preparation, properties, constitution and configuration of sucrose. Poly saccharides : A general study of starch and cellulose – uses of cellulose in industries. | 12 | Chalk & Talk, Power Point |

Course Designed by: Dr. K. Muthupandi & Dr. V. Ramasamy Raja

| | Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print | | | | | | | | | | | |
|-----------------------------|--|---------------------------------------|----------------------|--------------|----------------------|--------------|---------------------|----------------|--|--|--|--|
| | Articulation Mapping – K Levels with Course Outcomes (COs) | | | | | | | | | | | |
| Section A Section B Section | | | | | | | | | | | | |
| Inte | Cos | K Level | MCQ | 5 | Short Ans | swers | Section C | Section D | | | | |
| rnal | 005 | II Level | No. of. Questions | K – Level | No. of. Questions | K - Level | Either or Choice | Open Choice | | | | |
| CI CO1 | | Up to K2 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | | |
| AI | CO2 | Up to K3 | 2 | K1 & K2 | 2 | K2 | 2 (K3&K3) | 2(K2 & K3) | | | | |
| CI | CO3 | Up to K2 | 2 | K1 & K2 | 1 | K2 | 2 (K2&K2) | 1(K2) | | | | |
| AII | CO4 | Up to K4 | 2 | K1 & K2 | 2 | K2 | 2 (K3&K3) | 2(K3 &K4) | | | | |
| | | No. of Questions to be asked | 4 | | 3 | | 4 | 3 | | | | |
| - | estion tern | No. of Questions to be answered | 4 | | 3 | | 2 | 2 | | | | |
| CIA | I & II | Marks for each question | 1 | | 2 | | 5 | 10 | | | | |
| | | Total Marks for each section | 4 | | 6 | | 10 | 20 | | | | |

| | | Dist | ribution of] | Marks with | K Level C | IAI& | CIA II | |
|-----|------------|--|---|---|-------------------------------|----------------|--------------------------------------|---------------------|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % |
| | K1 | 2 | 2 | - | - | 4 | 6.67 | 67 |
| | K2 | 2 | 4 | 10 | 20 | 36 | 60 | 07 |
| CIA | K3 | - | - | 10 | 10 | 20 | 33.33 | 33 |
| I | K4 | - | - | - | - | - | - | - |
| I | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 |
| | K1 | 2 | 2 | - | - | 4 | 6.67 | 50 |
| | K2 | 2 | 4 | 10 | 10 | 26 | 43.33 | |
| CIA | K3 | - | - | 10 | 10 | 20 | 33.33 | 33 |
| II | K4 | - | - | - | 10 | 10 | 16.67 | 17 |
| | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| S | Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs) | | | | | | | | | | |
|--------|---|---------------|---------------------|--------------|--------------------|--------------|----------------------------|-------------------------------|--|--|--|
| | | | MCC | | Short An | swers | Section C | Castier D | | | |
| S.No | COs | K - Level | No. of Questions | K – Level | No. of Question | K – Level | (Either / or Choice) | Section D (Open Choice) | | | |
| 1 | CO1 | Up to K 2 | 2 | K1,K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | |
| 2 | CO2 | Upto K 3 | 2 | K1&K 2 | 1 | K1 | 2 (K3&K3) | 1(K3) | | | |
| 3 | CO3 | Up to K 3 | 2 | K1&K 2 | 1 | K2 | 2 (K3&K3) | 1(K3) | | | |
| 4 | CO4 | Up to K 4 | 2 | K1&K 2 | 1 | K2 | 2 (K3&K3) | 1(K4) | | | |
| 5 | CO5 | Up to K 4 | 2 | K1&K 2 | 1 | K2 | 2 (K3&K3) | 1(K4) | | | |
| No. of | Questions | s to be Asked | 10 | | 5 | | 10 | 5 | | | |
| No | No.of Questions to be answered | | 10 | | 5 | | 5 | 3 | | | |
| Mai | rks for eac | h question | 1 | | 2 | | 5 | 10 | | | |
| Total | Marks for | each section | 10 | | 10 | | 25 | 30 | | | |
| | (Figures | in parenthes | is denotes, qu | estions s | hould be as | ked with | the given K | level) | | | |

| | | D | istribution of | Marks with | K Level | | |
|---------------------|--|---|-------------------------------------|--------------------------------|----------------|--------------------------------------|----------------|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % |
| K1 | 5 | 4 | - | - | 9 | 7.5 | 22 |
| K2 | 5 | 6 | 10 | 10 | 31 | 25.83 | 33 |
| K3 | - | - | 40 | 20 | 60 | 50 | 50 |
| K4 | - | - | - | 20 | 20 | 16.67 | 17 |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 |
| NB: Hig of K lev | | erformance o | of the students | s is to be asso | essed by a | attempting | higher level |

| Section | A (Mu | Itiple Cho | ice Questions) |
|----------|---------|------------|--|
| Answei | r All Q | uestions | (10x1=10 marks) |
| Q.No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| Section | B (Sho | ort Answei | rs) |
| Answe | r All Q | uestions | (5x2=10 marks) |
| Q.No | CO | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| Section | C (Eit | her/Or Ty | pe) |
| Answei | r All Q | uestions | (5 x 5 = 25 marks) |
| Q.No | CO | K Level | Questions |
| 16) a | CO1 | K2 | |
| 16) b | CO1 | K2 | |
| 17) a | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K3 | |
| 19) b | CO4 | K3 | |
| 20) a | CO5 | K3 | |
| 20) b | CO5 | K3 | |
| | | | ormance of the students is to be assessed by attempting higher |
| level of | | | <u></u> |
| | | en Choice | |
| | | Three ques | |
| Q.No | CO | K Level | Questions |
| 21 | CO1 | K2 | |
| 22 | CO2 | K3 | |
| 23 | CO3 | K3 | |
| 24 | CO4 | K4 | |
| 25 | CO5 | K4 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| | | | | PRACTICAL – I Oualitative Analysis) | | | | | | |
|---|---|---|--|---|--|--|-----------------------------------|-------|---|----------|
| Course Code(Inorganic Semi Micro – Qualitative Analysis)Course Code21UCHCP1LPCourse CodeCourse Code | | | | | | | | | С | |
| Category | Core | | | | | | L P - 2 | | | |
| lature of Course: | EMPLOYABI | LITY | ✓ | SKILL ORIENTED | ✓ | ENTREPRE | NEU | ✓ | | |
| Reminiscend Apply the construct for Execute the Construct for Duration of Anal micro method Anions: Cations: La Construct for | ves: asic properties ce the anionic a oncept of anion confirmation te our radicals with f examination : lysis of a mixtu od two cations rbonate, sulphat rate, phosphate ead, bismuth, co | of salt n nd catic ic and c est for th <u>n correc</u> 3hrs ure cont e, nitrat and chr opper, c manga | nixtu onic ation e ar t pro- cainin te, flr oma cadm nese ium. Dis | ares. species in the salt mixtunic species in semi micro species in semi micro species in semi micro species and cations present ocedure during analysis of the semi semi semi semi species of the semi species of the semi semi species of the semi semi semi semi species of the semi semi semi semi semi semi semi species of the semi semi semi semi semi semi semi sem | res. o qua t in th of the n one le, ioo and I calci | litative analys ne salt mixture salt mixtures. is an interfer dide, oxalate, II), aluminium | is. s. ing i | n sem | | 3 |
| Laboratory Performance | ce | : 30 n : 10 n | | | : | 10 mark 10 mark 40 mark | .S .S | I KS | | |
| Total | | : 40 n | narks | s Total | : | 60 mark | S | | | |
| | | | | | | Total Lec | ture | Hour | S | 30 Hi |

| 2. <u>htt</u> 3. <u>htt</u> | 1. https://www.youtube.com/watch?v=cEOvj6jkdDw 2. https://www.youtube.com/watch?v=T3hi_xEpaDg 3. https://www.youtube.com/watch?v=BK7rf4XE4f8 4. https://www.youtube.com/watch?v=QQ01e-BUZWs | | | | | | |
|--------------------------------|---|------------|--|--|--|--|--|
| Cours | Course Outcomes: K Level | | | | | | |
| On th | On the completion of the course the student will be able to | | | | | | |
| CO1: | Identify the basic radical and its group in the given salt mixture. | [Up to K2] | | | | | |
| CO2: | Understand the qualitative analysis skill of any given inorganic salt mixture. | [Up to K3] | | | | | |
| CO3: | Develop the acid radicals present in the given inorganic salt mixture. | [Up to K3] | | | | | |
| CO4: | Analyze the basic radical systematically. | [Up to K4] | | | | | |
| CO5: | Apply the four radicals with correct procedure during analysis of the salt mixtures | [Up to K4] | | | | | |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | | | |
|------------------------|--------------------------|------|------|------|------|------|--|--|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | | | |
| CO5 | 2 | 3 | 1 | 3 | 2 | 1 | | | | |
| Weightage | 11 | 10 | 9 | 11 | 9 | 11 | | | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| UNIT | INORGANIC SEMI MICRO – QUALITATIVE ANALYSIS | Hrs | Mode |
|------|--|-----|-----------|
| I | Duration of examination: 3hrs Analysis of a mixture containing two anions of which one is an interfering in semi-micro method two cations Anions: Carbonate, sulphate, nitrate, fluoride, chloride, bromide, iodide, oxalate, Borate, phosphate and chromate. Cations: Lead, bismuth, copper, cadmium, antimony, iron (II and III), aluminium, Chromium, zinc, manganese, cobalt, nickel, barium, calcium, Magnesium and ammonium. | 30 | Practical |

Course Designed by: Dr. V. Ramasamy Raja & Dr. R. Satheesh



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| | ALLIED PHYSI | C S-II: (1 | Electricit | ty, Electroi | nics, | Op | otics a | nd Mo | dern | Physi | ics) |
|---|---|--|--|---|--|---|---|--|---|--|---|
| Course Code | 21UPHA21 | | | | | | | | L | Р | С |
| Category | Allied | | | | | | | | 4 | - | 3 |
| Nature of cours | e: EMPLOYABIL | JTY ✓ | SKILL (| ORIENTE | D 🗸 | E | NTRE | PREN | EURS | SHIP | |
| Course Objecti | ives: | | | | | | | | | | |
| The learners wil | | | | | | | | | | | |
| | d the laws of electr | • | | | | | | | | | |
| | lifferent types of di | | | ors | | | | | | | |
| | imal and binary nun | • | | | | _ | | | | | |
| | d the various types of | | - | | inter | fer | ence a | nd diffi | raction | n | |
| | d and apply the basi | ic concep | ots of lase | er | | | | | | | |
| | ctricity | | | | | | | | | 12 | |
| | pression for C of a p | | | | | | | | | | |
| | ng of charges betwe | | | | | | | | | | |
| | tone's network – C | • | - | | | | | istance | – Pri | nciple | e of |
| | Calibration of amn | neter and | voltmete | er(low rang | ge on | ly) | | | | | |
| | ctronics | | | | | | | | | 12 | |
| | orking of n-p-n tra | | | | | | • | | | | |
| | fier – Frequency res | | | | | | | | | | |
| OPAMP and it | s characteristics – | OPAME | N 11 | | | | | | | D I | |
| | | | | | | | - | c circu | iits – | Boo | lear |
| algebra – De Mo | organ's theorem – C | | | | | | - | c circı | iits – | | |
| algebra – De Mo Unit: III Geo | organ's theorem – C ometrical Optics | OR, AND | D, NOR , | NOT , NAI | VD g | ate | S | | | 12 | 2 |
| algebra – De Mo Unit: III <i>Geo</i> Deviation produ | organ's theorem – Cometrical Optics Inced by thin lens – H | DR, AND | D, NOR , gth of tw | NOT , NAM | $\frac{\text{ND g}}{\text{s in a}}$ | ate and | s out o | f conta | ct – R | 12 lefrac | 2 tior |
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| | Unit – I : 1.5,1.6, 1.9-1.14, 1.18,1.19,2.1,2.3-2.7 | |
|-------------|---|----------|
| | Unit – II : 4.1,4.2,4.4,4.5.4.6,4.10-4.12,4.14-4.18,4.24,4.25, 5.1-5.7,5.9-14,5.16 | |
| | 2. R.Murugeshan, Optics Spectroscopy and Modern Physics, Madurai, First | Edition, |
| | July 2016. | |
| | Unit – IIII : 1.1-1.3,1.5-1.11,1.13,1.17,1.23,1.24 | |
| | Unit – IV : 2.1,2.2,2.4-2.6,2.9,2.10,3.1,3.2,3.4,3.5-3.10 | |
| | 3. P.Mani, A Text book of Engineering Physics, 12th edition, , Dhanam Publica | tions, |
| | Chennai | |
| | Unit – V : 7.1 – 7.45 | |
| Books | for References: | |
| 1. Kal | kaniand Bhandari Sultan, Optics and Spectroscopy , Chand and Sons, New | |
| Delhi | | |
| | laland Subramanyam., A Text book of Optics, S. Chandand Co, New Delhi, 2004. | |
| | K.Sharma, Spectroscopy, GOEL Publishing House, Meerut, 2006. | |
| | rayanamoorthyandNagarathinam, Electricity and Magnetism , National Publishin | ng Co. |
| | Resources: | -8 , |
| | tps://www.youtube.com/watch?v=ML7HcZo6IaE | |
| | tps://www.khanacademy.org/science/physics/light-waves/introduction-to-ligh | t_ |
| | aves/v/polarization-of-light-linear-and-circular | <u>E</u> |
| | e Outcomes | K Level |
| | | K Level |
| After s | uccessful completion of the course, the student is expected to | |
| 001 | Remember principle of capacitors, Kirchhoff's laws, forward and reverse bias, | 17.0 |
| CO1: | frequency response, modulation, focal length, dispersive power, cordinal | K2 |
| | points, double refraction, Biot's law, Principals of Laser. | |
| | Understand energy of a capacitor, principle of potentiometer, diode | |
| CO2: | characteristics, working of npn transistor, logic circuits, basics of types of | K3 |
| | laser. | |
| CO3: | Apply Kirchhoff's laws, Boolean algebra, Refraction through a prism, | K3 |
| 005. | Einstein's coefficients | KJ |
| | Calibration of ammeter and voltmeter, OP AMP as an adder and subtractor, | |
| CO4: | logic gates, deviation without dispersion , dispersion without deviation, Q.W.P, | K4 |
| | H.W.P, Applications of lacer. | |
| | Examine parallel plate capacitor, Cary Foster bridge, transistor characteristics | |
| COL | CE mode, frequency of Hartley oscillator, Specific rotatory power, | K4 |
| UUS: | | |
| CO5: | Nd:YAG,CO ₂ ,Semiconductor lasers | |

CO & PO Mapping:

| COS | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
|------|------|------|-------------|------|------|------|
| CO 1 | 3 | 2 | 2 | 2 | 2 | 2 |
| CO 2 | 3 | 2 | 1 | 2 | 2 | 2 |
| CO 3 | 3 | 2 | 2 | 2 | 2 | 2 |
| CO 4 | 3 | 2 | 2 | 1 | 2 | 2 |
| CO 5 | 2 | 2 | 1 | 1 | 2 | 2 |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN – ALLIED PHYSICS - II

| Unit | Electricity, Electronics , Optics and Modern Physics | Hrs | Pedagogy |
|------|--|-----|--|
| Ι | Electricity Capacitors –Expression for C of a parallel plate capacitor – Energy of a charged capacitor – Loss of energy on sharing of charges between two capacitors- Kirchoff's laws – Application of Kirchhoff's laws to Wheatstone's network – Carey Foster Bridge – Measurement of resistance – Principle of Potentiometer – Calibration of ammeter and voltmeter(low range only) | 13 | Lecture method, PPT, Demonstration |
| Ш | Electronics Transistor – Working of n-p-n transistor– Characteristics(CE mode only) –Common - Emitter transistor amplifier – Frequency response - Hartley oscillator –Modulation – Types of Modulation - OPAMP and its characteristics – OPAMP as adder and subtractor– Logic circuits – Boolean algebra – De Morgan's theorem – OR, AND, NOR, NOT, NAND gates | 12 | Lecture method, PPT, Demonstration |
| Ш | Geometrical Optics Deviation produced by thin lens – Focal length of two thin lenses in and out of contact – Refraction through a thin prism – Dispersion – Dispersive power – Combination of thin prisms to produce (a) Deviation without dispersion and (b) Dispersion without deviation – Direct vision spectroscope – Chromatic aberration in lenses – Spherical aberration in lenses – Theory of primary and secondary rainbows. | 11 | Lecture method, PPT, Model |
| IV | Physical Optics Interference in thin films – air wedge – Newton's rings (reflected beam only) – Determination of wavelength – Diffraction – Theory of plane transmission grating (normal incidence only) – Experiment to determine wavelengths - Double refraction – Nicol prism – Construction, action and uses – Quarter wave plate (QWP) – Half wave plate (HWP) – Optical activity – Biot's laws – Specific rotatory power – Laurente' Half shade polarimeter – Determination of specific rotatory power | 12 | Lecture method, PPT |
| V | Lasers Introduction of Lasers-Spontaneous and stimulated emission- Population Inversion-Einstein's A and B coefficients-derivation. Types of lasers-Nd:YAG,CO ₂ ,Semiconductor lasers-Industrial and Medical Applications. | 12 | Lecture method, PPT |

Course Designed by: 1. Mrs.A.Lakshmi, 2. Dr.R.Sangeetha

| | Learning Outcome Based Education & Assessment (LOBE) | | | | | | | | | | |
|--------------|--|---------------------------------------|-----------------------------------|--------------|--------------------------|--------------|----------------------|----------------|--------------------------|-------------------------------|----|
| | Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs) | | | | | | | | | | |
| | | | | Section A | | Sectio | | Secti (Eith | ion C ier or bice) | Section D (Open Choice) | |
| Inte rnal | COs | - Le | Unit | MC | Qs | | Short Answers | | | No. | |
| 11181 | vel | | No. of. Questions | K - Level | No. of. Question s | K - Level | of. Ques tions | K - Level | of. Ques tions | K - Level | |
| CI | CO1 | K1 | Ι | 2 | K1&K2 | 1 | K1 | 2 | K2 | 1 | K2 |
| AI | to CO5 | to K4 | Π | 2 | K1&K2 | 2 | K2 | 2 | K3 | 2 | K3 |
| CI | CO1 | K1 | III | 2 | K1&K2 | 1 | K2 | 2 | K3 | 1 | K3 |
| AII | to CO5 | to K4 | IV | 2 | K1&K2 | 2 | K2 | 2 | K4 | 2 | K4 |
| | | No. of Questions to be asked | | 4 | | 3 | | 4 | | 3 | |
| - | estion tern | No Que to | o. of estions o be wered | 4 | | 3 | | 2 | | 2 | |
| CIA | CIA I & II | | ks for ach estion | 1 | | 2 | | 5 | | 1 | 0 |
| | | | otal ks for ach ction | 4 | | 6 | | 1 | 0 | 2 | 0 |

| | | Dist | ribution of I | Marks with | K Level C | IA I & (| CIA II | |
|-----|------------|--|---|---|-------------------------------|----------------|--------------------------------------|---------------------|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % |
| | K1 | 2 | 2 | | | 4 | 6.7 | 50 |
| | K2 | 2 | 4 | 10 | 10 | 26 | 43.3 | 30 |
| CIA | K3 | | | 10 | 20 | 30 | 50.0 | 50 |
| | K4 | | | | | | | - |
| L | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 |
| | K1 | 2 | 2 | | | 4 | 6.7 | 167 |
| | K2 | 2 | 4 | | | 6 | 10.0 | 16.7 |
| CIA | K3 | | | 10 | 10 | 20 | 33.3 | 33.3 |
| II | K4 | | | 10 | 20 | 30 | 50.0 | 50 |
| | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 |

K1- Remembering and recalling facts with specific answersK2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

<u>UNIT-V</u> will be allotted for individual Assignment in <u>CO5 - K4</u> level which carries five marks as part of CIA component.

| S | ummati | ive Exar | ninatio | n – Blue | | rticulati mes (CC | - | ping – H | K Level | with Cou | ırse |
|-------------------------|---------------------------------|----------------|---------|------------------------|--------------|------------------------|--------------|------------------------|--------------------------|------------------------|-------------------|
| S.No. | COs | К- | Unit | MO |)Qs | Sh | ort wers | (Eithe | on C er / or bice) | | tion D Choice) |
| 5. 1 N 0. | COS | Level | Umt | No.of Ques tions | K – Level | No.of Ques tions | K – Level | No.of Ques tions | K – Level | No.of Ques tions | K – Level |
| 1 | CO1 - CO5 | K1 to K4 | Ι | 2 | K1 & K2 | 1 | K1 | 2 | K2 & K2 | 1 | K2 |
| 2 | CO1 - CO5 | K1 to K4 | II | 2 | K1 & K2 | 1 | K 1 | 2 | K3 & K3 | 1 | K3 |
| 3 | CO1 - CO5 | K1 to K4 | ш | 2 | K1 & K2 | 1 | K2 | 2 | K3 & K3 | 1 | K3 |
| 4 | CO1 - CO5 | K1 to K4 | IV | 2 | K1 &K2 | 1 | K2 | 2 | K4 & K4 | 1 | K4 |
| 5 | CO1 - CO5 | K1 to K4 | V | 2 | K1 & K2 | 1 | K2 | 2 | K4 & K4 | 1 | K4 |
| No. of | No. of Questions to be Asked | | 10 | | 5 | | 1 | 0 | | 5 | |
| No. | No. of Questions to be answered | | 10 | | 5 | | 5 | | 3 | | |
| - | | ach ques | | 1 | | 2 | | 5 | | 10 | |
| Total N | Aarks fo | or each s | ection | 10 | | 10 | | 2 | 5 | | 30 |

| K Level | Section A (Multiple Choice Questions) | Dis Section B (Short Answer Questions) | stribution of Section C (Either/ or Choice) | Marks with Section D (Open Choice) | n K Leve Total Marks | l % of (Marks without choice) | Consolidated % |
|---------------------|--|--|--|--|----------------------------|---|-------------------|
| K1 | 5 | 4 | | | 9 | 12 | 47 |
| K2 | 5 | 6 | 10 | 10 | 31 | 34.66 | 47 |
| K3 | | | 20 | 20 | 40 | 27 | 27 |
| K4 | | | 20 | 20 | 40 | 26.66 | 26 |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 |
| NB: Hig of K lev | · • | erformance o | of the students | s is to be asso | essed by a | ttempting | higher level |

| | | - | ice Questions) |
|---------------|------------|-----------------------|--|
| | - | uestions | (10x1=10 marks) |
| Q.No | CO | K Level K1 | Questions |
| $\frac{1}{2}$ | CO1 CO1 | K1 K2 | |
| 3 | | | |
| | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| | | ort Answei | |
| | - | uestions | (5x2=10 marks) |
| Q.No | CO | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| | | her/Or Ty uestions | pe) (5 x 5 = 25 marks) |
| Q.No | CO | K Level | Questions |
| 16) a | 00 | | |
| 16) b | | | |
| 17) a | | | |
| 17) b | | | |
| 18) a | | | |
| 18) b | | | |
| 19) a | | | |
| 19) b | | | |
| 20) a | | | |
| 20) b | | | |
| , | gher le | vel of nerf | ormance of the students is to be assessed by attempting higher |
| level of | | | service of the statements is to se assessed by attempting ingher |
| | | en Choice |) |
| | | Three ques | |
| Q.No | CO | K Level | Questions |
| 21 | | | |
| 22 | | | |
| 23 | | | |
| 24 | | | |
| 25 | | | |
| <i></i> | | | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | ALLIED PHYSICS PR | RACTIC | CAL - I | | | | | | | |
|-----------------------|---|------------|--------------------|--------------|-------------------|---------|--------|----|--|--|
| Course Code | 21UPHAP1 | | | | | L | Р | С | | |
| Category | Allied | | | | | - | 2 | 1 | | |
| Nature of cours | se: EMPLOYABILITY | ✓ SKI | LL ORIENTED | \checkmark | ENTREPREN | EURS | HIP | | | |
| Course Object | ives: | L L | | 1 | l | | | | | |
| The learners wi | ll be able: | | | | | | | | | |
| 0 | vledge about the experim | ents bas | ed on Optics, Elec | tric | ity and Electro | nics | | | | |
| | 2. To demonstrate modulus of elasticity3. To understand the bending of beam, forward and reverse biasing, frequency responce | | | | | | | | | |
| | | | | g, fre | equency respon | nce | | | | |
| | d current conduction in e | | | | | | | | | |
| 5. To learn about | ut transistor amplifier, os | cillator a | and Operational an | npli | fier | | | | | |
| | | | | | | | | | | |
| LIS | ST OF EXPERIMENTS | S (Any F | ourteen Experime | nts) |) | | | | | |
| 1. Uniform ben | ding | | - (Pin & Micro | osco | ope) | | | | | |
| 2. Torsion Pend | lulum | | - Determination | on o | f Rigidity mod | ulus ar | nd M.I | [| | |
| 3. Thermal con | ductivity of Bad conduct | or | - Lee's disc | | | | | | | |
| 4. Sonometer | | | - Verification | of l | aws | | | | | |
| 5. Calibration o | f low range Voltmeter | | - Potentiomete | er | | | | | | |
| 6. Carey Foster | Bridge | | - Resistance & | z res | sistivity of a wi | ire. | | | | |
| 7. Spectrometer | | | - Refractive in | Idex | of a Prism | | | | | |
| 8Mirror Galva | nometer | | - Voltage and | curi | rent sensitivene | ess | | | | |
| 9.LCR – Series | resonance | | - Determination | | - | | | | | |
| 10.Air wedge | | | - Thickness of | a w | ire | | | | | |
| 11.Grating N by | y λ Normal incidence | | - Spectrometer | | | | | | | |
| | transistor amplifier | | - CE mode | | | | | | | |
| 13.Hartley osci | | | - Determination | | | | | | | |
| | – NAND and NOR | | - Using Discret | | 1 | | | | | |
| 15.Zener diode | | | - Forward & Re | ever | rse Characterist | tics | | | | |
| 16.OP AMP | | | - Adder and Sul | | | | | | | |
| | | |] | <u>Fot</u> a | al Practical Ho | ours | 30 H | rs | | |
| Books for Stud | lv: | | | | | | | | | |

Books for Study:

1. Srinivasan.M.N.,Balasubramanian.S.,Ranganathan.R., **A Text Book of Practical Physics**, 2017 Edition Sultan Chand & Sons

Books for References:

- 3. Ouseph.C., Practical Physics and Electronics, 2013.S. Viswanathan.P.Ltd
- 4. Practical Physics and Electronics, C.C.Ouseph, U.J.Rao, V.Vijayendran, S.Viswanathan Publishers(2007)

Web Resources:

- 1. https://nptel.ac.in/course.html/physics/experimental physics I, II and III
- 2. https://nptel.ac.in/courses/115/105/115105110/
- 3. https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-rZn_LgLofRX7n8z4tHYK

| Course | e Outcomes | K Level |
|--------------|--|-----------|
| On suc | ccessful completion of the course, the learners should be able to | |
| | Understand and evaluate the Young's modulus and Rigidity modulus of the | |
| CO1: | given material, the ways to calibrate a low range voltmeter using | K4 |
| | potentiometer | |
| CO2: | Acquire the knowledge of the characteristics of an operational amplifier | K3 |
| CO3: | Apply the basic principles of optics to determine the thickness of a wire | K4 |
| CO4: | Analyze the electrical parameters like resistance and resistivity using Carrey | K4 |
| C04: | Foster bridge and characteristics of Zener diode | N4 |
| CO5 : | Construct Amplifier and Oscillator | K4 |

CO & PO Mapping:

| COS | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
|------|------|------|------|------|------|------|
| CO 1 | 3 | 2 | 2 | 1 | 2 | 2 |
| CO 2 | 3 | 2 | 2 | 1 | 2 | 2 |
| CO 3 | 3 | 2 | 2 | 1 | 2 | 2 |
| CO 4 | 3 | 2 | 2 | 1 | 2 | 2 |
| CO 5 | 3 | 2 | 2 | 1 | 2 | 2 |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| Semester | Allied Physics Practical - I | Hrs | Pedagogy |
|----------|---|-----|---------------|
| II | Carey Foster Bridge - Resistance & resistivity of a wire. Spectrometer - Refractive indexof a Prism Mirror Galvanometer - Voltage and current sensitiveness Air wedge - Thickness of a wire Grating N by λ Normal incidence - Spectrometer Single stage transistor amplifier - CE mode Hartley oscillator - Determination of frequency OP AMP - Adder and Subtractor | 30 | Demonstration |

Course Designed by: 1. Mrs.A.Lakshmi, 2. Dr.R.Sangeetha



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Na | me | DA | IRY CHEMISTRY | | | | | | | |
|--|---|--|--|-------------------|--|--------|--------------------|-------|----------|------|
| Course Co | de | 21U | CHS21 | | | | | L | Р | С |
| Category | ; | Ski | 1 | | | | | 2 | - | 2 |
| Nature of c | ourse: | | EMPLOYABILITY | | SKILL ORIENTED | ✓ | ENTREPREN | EURS | SHIP | ✓ |
| Course Objectives: To Recollect the composition of milk and processing of milk To Remember the major milk products and its estimation. To Classify the special milk and fermented milk products on their ingredients To Execute the types of milk products and its applications. To Determine the composition of milk products and their physical properties. | | | | | | | | | | |
| Unit: I | Milk prote | OMPOSITION OF MILK ilk – definition – general composition of milk – constituents of milk – lipids, oteins, carbohydrate, vitamins and minerals – physical properties of milk – lour, odour, acidity, specific, gravity, viscosity and conductivity. | | | | | | | | |
| Unit: II | PRO Micr chem paste | ROCESSING OF MILKacrobiology milk – destruction of microorganisms in milk – physico – emical changes taking place in milk due to processing – boiling, steurization – types of pasteurization –Vacuum pasteurization – Ultra High mperature Pasteurization.6 | | | | | | | | |
| Unit: III | Creat gravi creat | IAJOR MILK PRODUCTS ream – definition – composition – chemistry of creaming process – ravitational and centrifugal methods of separation cream – estimation of fat in eam. Butter – definition -estimation of acidity and moisture content in butter. hee – major constituents – common adulterants added to ghee. | | | | | | | | |
| Unit: IV | SPE Stand diagr milk | CIA darc ram – d | L MILK lised milk – definition of manufacture – He efinition composition | – r omc and | merits – reconstituted r ogenised milk – flavor nutritive value. | nilk - | -definition – flov | | 6 | |
| Unit: V | FERMENTED AND OTHER MILK PRODUCTSFermentation of milk – definition, condition- Indigeneous products– Gulabjamun, chana sweet, Rasogolla. Ice cream – definition – percentage | | | | | | | | 6 | |
| | | | | | | Tota | al Lecture Hour | S | 30 H | rs |
| & C | Shree ompan vathi S | Gh ny L Suno | td, 2013. lari. K, Applied Chem | - | ots of Applied Chemist y, 1st Edition. Chennai | - | | | : S.Cl | hand |
| | | | | Mat | rh,E.H, Fundamentals of | of Da | iry Chemistry. 1s | st Ed | ition.] | New |

Delhi: CBS Publishers & Distributors Pvt.Ltd., 1998.

- 2. Sukumar De. Outlines of Dairy Technology. 1st Edition. New Delhi: Oxford University Press, 2000.
- 3. K.S. Rangappa and K.T Acharya, Indian Dairy products, Asia Publishing House, 1975.

Web Resources:

Course Outcomes:

- 1. <u>https://www.youtube.com/watch?v=Vo8m9QvNeAU</u>
- 2. <u>https://www.youtube.com/watch?v=uYhbekSGMZY</u>
- 3. <u>https://www.youtube.com/watch?v=oHCntgYIJbE</u>
- 4. https://nptel.ac.in/courses/126/105/126105013/

K Level

| 000110 | | | | | | | | | | |
|-------------|---|------------|--|--|--|--|--|--|--|--|
| On th | On the completion of the course the student will be able to | | | | | | | | | |
| CO1: | Understand the chemistry of milk products. | [Up to K2] | | | | | | | | |
| CO2: | Outline the techniques of milk processing. | [Up to K3] | | | | | | | | |
| CO3: | Construct the flow chart diagram in the manufacture of special milk | [Up to K3] | | | | | | | | |
| CO4: | Illustrate the manufacture of various dairy products | [Up to K4] | | | | | | | | |
| CO5: | Determine the chemistry of milk products and manufacture of various dairy | [Up to K4] | | | | | | | | |
| 005. | products. | | | | | | | | | |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | |
|-----------------|--------------------------|-------------|-------------|------|-------------|-------------|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | |
| CO5 | 2 | 3 | 1 | 3 | 2 | 1 | | |
| Weightage | 11 | 10 | 9 | 11 | 9 | 11 | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| UNIT | DAIRY CHEMISTRY | Hrs | Mode |
|------|--|-----|---------------------------------------|
| I | COMPOSITION OF MILK Milk – definition – general composition of milk – constituents of milk – lipids, proteins, carbohydrate, vitamins and minerals – physical properties of milk – colour, odour, acidity, specific, gravity, viscosity and conductivity. | 06 | Chalk & Talk, Power Point |
| II | PROCESSING OF MILK Microbiology milk – destruction of microorganisms in milk – physico – chemical changes taking place in milk due to processing – boiling, pasteurization – types of pasteurization –Vacuum pasteurization – Ultra High Temperature Pasteurization. | 06 | Chalk & Talk, Power Point |
| ш | MAJOR MILK PRODUCTS Cream – definition – composition – chemistry of creaming process – gravitational and centrifugal methods of separation cream – estimation of fat in cream. Butter – definition -estimation of acidity and moisture content in butter. Ghee – major constitutents – common adulterants added to ghee. | 06 | Chalk & Talk, Power Point |
| IV | SPECIAL MILK Standardised milk – definition – merits – reconstituted milk –definition – flow diagram of manufacture – Homogenised milk – flavoured milk – condensed milk – definition composition and nutritive value. | 06 | Chalk & Talk, Power Point |
| V | FERMENTED AND OTHER MILK PRODUCTS Fermentation of milk – definition, condition- Indigeneous products– Gulabjamun, chana sweet, Rasogolla. Ice cream – definition – percentage composition types – Ingredients – manufacture of ice-cream -milk powder – definition – need for making milk powder. Visit to a pasteurization factory / Milk product company and submission of a report. | 06 | Chalk & Talk, Power Point |

Course Designed by: Dr. V. Ramasamy Raja & Dr. K. Muthupandi



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Na | Course Name DYE CHEMISTRY | | | | | | | | | | | | |
|------------------|--|---|---------|----------|------------|------|-----------------|------------|----------|-------------------|-------|-------------|----|
| Course Co | ode | 21 | UCH | S22 | | | | | | | L | P | С |
| Category | | Sk | ill | | | | | | | | 2 | - | 2 |
| Nature of c | ourse | : | EMP | LOYAE | BILITY | | SKILL OR | IENTED | ✓ | ENTREPREN | EUR | SHIP | ✓ |
| Course Ol | ojecti | ves | • | | | | | | | | | | |
| | | | | | colour a | | • | | | | | | |
| | - | | - | | | | f its various | | | | | | |
| | - | | - | - | • | | - | • | | ir applications | | | |
| | | | - | | | | - | - | | ng vat dyes base | ed | | |
| • To Det | | | | | | | nt and applic | | l the | eir uses. | | | |
| | - | | | | - | | OF COLO | | muod | to wavalangth | | | |
| Unit: I | | Colour and Constitution – Relationship of Colour observed to wavelength | | | | | | | | | 06 | | |
| | | of light absorbed – Terms used in Colour Chemistry – Chromophores, Auxochromes, Bathochromes shift, Hypsochromic shift. | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | DIRECT AND DISPERSE DYES | | | | | | | | | | | | |
| Unit: II | Direct or substantive dyes, mordent dyes, vat dyes, Ingrain or developed | | | | | | | | 06 | | | | |
| | - | | - | • | - | • | • | | - | irit soluble dye, | | | |
| | | | - | | | | | | | examples only). | | | |
| | NITROGENOUS, TRIPHENYL, AZO AND PHTHALEIN DYES | | | | | | | | | | | | |
| | Classification according to shomical structures a) Nitra and Nitras des | | | | | | | | | | | | |
| Unit: III | Classification according to chemical structure: a) Nitro and Nitroso dyes. b) Tripheyl methane dye -malachite green, crystal violet and its | | | | | | | | 06 | | | | |
| | applications. c) Azo dyes –, methyl orange, and congo red. d) Phthalein | | | | | | | | 00 | | | | |
| | dye- phenolphthalein and fluorescein. (Definition, applications and | | | | | | | | | | | | |
| | examples only) | | | | | | | | | | | | |
| | | - | | | AND T | RIA | ZINE DYE | S | | | | | |
| Unit: IV | | | | | | | | | | | | 06 | |
| | Azi | ne, | Oxaz | zine an | d Triazi | ne | Dyes – Sy | nthesis a | nd | applications of | | vu | |
| | - | | | | <u> </u> | | es based on a | <u> </u> | one. | | | | |
| | | | | | | | PLICATION | | | | | | |
| Unit: V | | | | - | 0 | • | 1 0 | | <u> </u> | nic pigments – | | 06 | |
| | | | | | | - | | cations of | dye | es in other areas | | | |
| | — m | eat | cine, c | cosmetic | cs, 100d a | and | beverages. | Та | tal | Lecture Hours | | 30 H | |
| Doole for | . St | d | | | | | | 10 | nai | Lecture nours | | <u>зо п</u> | 15 |
| Books for | | • | wal s | vntheti | Dvec | Hin | nalaya Publis | hing Hou | se ' | 2016 | | | |
| Books for | - | | | ynnieth | - Dyes – | 1111 | nalaya i uolis | ining 110u | 3C, 4 | 2010. | | | |
| | | | | ahl Ad | vanced (|)roa | nic Chemisti | v 2012 | | | | | |
| | | | | | | - | | - | ltan | & Sons Publicat | tions | 2019 | Э. |
| | | | | | | | 0 | • | | c Chemistry, Vi | | | |
| House 197 | | | | | | | , | 2 | | ···· J ? · · - | | | - |

House, 1976.

| Web I | Web Resources: | | | | | | | |
|----------------|---|------------|--|--|--|--|--|--|
| 1. <u>http</u> | 1. https://www.youtube.com/watch?v=a6Lw7Dzwvqo | | | | | | | |
| 2. <u>http</u> | os://www.youtube.com/watch?v=sLcT7P-ZS4E | | | | | | | |
| 3. <u>http</u> | os://www.youtube.com/watch?v=SFH0iJmnTLY | | | | | | | |
| Cours | Course Outcomes: K Level | | | | | | | |
| On th | On the completion of the course the student will be able to | | | | | | | |
| CO1: | Identify the colour and constitution observed to wavelength of light. | [Up to K2] | | | | | | |
| CO2: | Outline the direct or disperse dyes and applications. | [Up to K3] | | | | | | |
| CO3: | Apply Azine, Oxacine, triazine dyes, pigments towards its applications. | [Up to K3] | | | | | | |
| CO4: | Classify the Nitro, Nitroso, Triphenyl methane, Azo and Phthalein dyes. | [Up to K4] | | | | | | |
| CO5: | Determine the properties of dyes and apply in medicine, cosmetics, food and | [Up to K4] | | | | | | |
| 005: | beverages. | | | | | | | |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | |
|-----------------|--------------------------|-------------|-------------|------|-------------|------|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | |
| CO 1 | 2 | 3 | 2 | 3 | 1 | 2 | | |
| CO 2 | 1 | 2 | 3 | 1 | 2 | 3 | | |
| CO 3 | 2 | 2 | 2 | 2 | 3 | 3 | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | |
| CO5 | 2 | 3 | 1 | 3 | 2 | 1 | | |
| Weightage | 10 | 11 | 10 | 11 | 9 | 11 | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| UNIT | DYE CHEMISTRY | Hrs | Mode |
|------|--|-----|---------------------------------------|
| I | CHEMISTRY AND THEORY OF COLOURS Colour and Constitution – Relationship of Colour observed to wavelength of light absorbed – Terms used in Colour Chemistry – Chromophores, Auxochromes, Bathochromes shift, Hypsochromic shift. | 06 | Chalk & Talk, Power Point |
| II | DIRECT AND DISPERSE DYES Direct or substantive dyes, mordent dyes, vat dyes, Ingrain or developed dyes, Disperse dyes, sulphur dyes, reactive dyes, oil and spirit soluble dye, food, dry and cosmetic dyes. (Definition, applications and examples only). | 06 | Chalk & Talk, Power Point |
| ш | NITROGENOUS, TRIPHENYL, AZO AND PHTHALEIN DYES Classification according to chemical structure: a) Nitro and Nitroso dyes. b) Tripheyl methane dye -malachite green, crystal violet and its applications. c) Azo dyes –, methyl orange, and congo red. d) Phthalein dye– phenolphthalein and fluorescein. (Definition, applications and examples only) | 06 | Chalk & Talk, Power Point |
| IV | AZINE, OXACINE AND TRIAZINE DYES Azine, Oxazine and Triazine Dyes – Synthesis and applications of quinonoid dyes including vat dyes based on anthraquinone. | 06 | Chalk & Talk, Power Point |
| V | PIGMENTS AND THEIR APPLICATIONS Requirement of a pigment – Typical Organic and Inorganic pigments – Applications and their uses in paints – Applications of dyes in other areas – medicine, cosmetics, food and beverages. | 06 | Chalk & Talk, Power Point |

Course Designed by: Dr. R. Satheesh & Dr. J.E. Sangeetha





MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY

(For those who joined in 2021-2022 and after)

| Course Name | PHYSICAL CHEMIST | TRY | Y – I | | | | | | | | |
|---|--|-------|---------------------------|-------------------|---------|-------|--------------|--|--|--|--|
| Course Code | 21UCHC31 | | | | L | Р | С | | | | |
| Category | Core | | | | 4 | - | 4 | | | | |
| Nature of cours | e: EMPLOYABILITY | ✓ | SKILL ORIENTED | ENTREPREN | URSH | HIP | \checkmark | | | | |
| Course Objectives: | | | | | | | | | | | |
| • To Recall the characteristics of ideal and real gases and deviations of real gases from ideal | | | | | | | | | | | |
| behaviour. | | | | | | | | | | | |
| | er the law of distribution | | | tics of colloids. | | | | | | | |
| - | the classification of adso | - | • | | | | | | | | |
| | the purification of colloid | ls ar | nd comparison between o | order and molecu | ılarity | of a | | | | | |
| reaction | | | | | | | | | | | |
| | the effect of temperature | re o | n various velocities and | applications of c | olloid | ls, | | | | | |
| ^ | nd catalysis. | | | | | | | | | | |
| | SEOUS STATE | | <u>C 1 D 1 1 1</u> | <u>C1 1 1 1 7</u> | | 12 | | | | | |
| | of Gases and its parameter | | | | | | | | | | |
| | Lussac's law, Avogadro' | | | 1 | | | | | | | |
| | Derivation of ideal gas la | | 1 | | | | | | | | |
| | l – Boltzmann law of dist - Effect of temperature | | | | | | | | | | |
| - | Different types of m | | | - | | | | | | | |
| | ge Velocity and their calc | | | | | 11006 | 1010 | | | | |
| | LLOIDAL STATE | Juiu | tions i incipie of equipu | ittelon of energy | • | 12 | | | | | |
| | Distinction between tr | ue | solution. colloidal di | spersion and | suspe | | | | | | |
| | colloids. Difference bet | | | 1 | - | | | | | | |
| | sis and Ultrafiltration. | | | | | | | | | | |
| | Origin of Charge on Col | | | | | | | | | | |
| Number. Appli | cation of colloids in | foo | ds, medicines, industr | ial goods, sew | age | dispo | sal, | | | | |
| clarification of v | vater, smoke screens and | dete | ergent action of soap. | | | | | | | | |
| | SORPTION | | | | | 12 | | | | | |
| | lsorption, adsorbent, ads | | | - | | | | | | | |
| | orption and chemisorp | | - | _ | | | | | | | |
| - | gative adsorption, Adsorp | - | - | | | - | | | | | |
| | - factors influencing ad | | | | | | | | | | |
| | ations of adsorption in | | s masks, chromatograp | ny, cleaning of | suga | rs, p | aint | | | | |
| | is and adsorption indicate | ors | | | | 10 | | | | | |
| | TALYSIS | | Tourses of a statements | : | | 12 | | | | | |
| | inition – Characteristics | | | - | | | | | | | |
| • | t-Theories of catalysis - | | - | | • | | | | | | |
| - | ry- Action of Promoters atures-Mechanism – Micl | | | xampies. Elizyi | | laiys | 18 - | | | | |
| characteristic lea | atures-wieenamism – Mici | nael | ns - memen equation. | | | | | | | | |

| Uı | nit: V | it: V CHEMICAL KINETICS 12 | | | | | | | | | | |
|-----|--|--------------------------------|---------------|--------------|-------------------|-----------------|--------------|-------------|--|--|--|--|
| Int | roduct | ion – Rate of Re | eaction – | Rate law a | and Rate constant | nt – Order a | and Molecul | arity of a | | | | |
| rea | action. | Derivation of ra | te equation | on and hal | f-life period for | r first order- | - examples- | Catalytic | | | | |
| De | ecompo | sition of hydro | gen pero | xide – D | ecomposition o | f Dinitroger | n pentoxide | e. Pseudo | | | | |
| un | unimolecular reaction - Derivation of rate equation and half-life period. examples- inversion of | | | | | | | | | | | |
| ca | cane sugar and hydrolysis of ester by acid. second, third and zero order reactions – examples – rate | | | | | | | | | | | |
| eq | equation - half period (no derivation required). Methods for the determination of the order of a | | | | | | | | | | | |
| rea | reaction. Influence of temperature on the rate of reaction – Arrhenius rate equation and its | | | | | | | | | | | |
| sig | significance. Collision Theory of Reaction Rate and its limitations. | | | | | | | | | | | |
| | | | | | | Total Lect | ture Hours | 60 Hrs | | | | |
| Bo | ooks fo | r Study: | | | | | | | | | | |
| 5. | | Bahl, B. S Bahl | & G.D. T | uli, Essent | ials of Physical | Chemistry, S | S.Chand and | Co, New | | | | |
| | Delhi | , 2014. | | | | | | | | | | |
| Bo | ooks fo | r References: | | | | | | | | | | |
| 4. | Gilber | t. W. Castellan, P | hysical Ch | nemistry, N | arosa Publishing | house, third | edition 1985 | 5. | | | | |
| 5. | P.W. 4 | Atkins, Physical C | hemistry, | 7th edition | , Oxford univers | ity press, 200 |)1. | | | | | |
| 6. | S.K. I | Dogra and S. Dog | gra, Physic | cal Chemist | try Through Pro | blems, New | age internat | ional, 4th | | | | |
| ed | ition 1 | 996. | | | | | | | | | | |
| 7. | B.R. I | Puri, L.R. Sharma | and S.Pa | athania, Pri | nciples of Physi | cal Chemistr | ry, Shoban I | Lal Nagin | | | | |
| Cł | nand ar | d Co, 47 th edition | , 2017. | | | | | | | | | |
| 8. | S.H. 1 | Maron and J.B. I | Lando, Fu | ndamentals | of Physical Ch | emistry, Ma | cmillan lim | ited, New | | | | |
| Y | ork, 19 | 66. | | | | | | | | | | |
| W | eb Res | ources: | | | | | | | | | | |
| 1. | https:// | youtu.be/u3BWeog | wNN4 | | | | | | | | | |
| | | youtu.be/fctkOV_v | | | | | | | | | | |
| | | youtu.be/UIVJ4Jk | | | | | | | | | | |
| | | voutu.be/B_fg6ED | | | | | | | | | | |
| | | youtu.be/W8FhlG | <u>NnMkg</u> | | | | | | | | | |
| | | Dutcomes | | | | | | K Level | | | | |
| | | completion of the | | | | | | | | | | |
| | | lecall the postulate | | | - | ification of co | | Up to K2] | | | | |
| | | Discuss the gaseou | | | | | | Up to K3] | | | | |
| C | D3: E | inumerate the prop | perties of g | gaseous stat | e, colloids, adso | rption and ca | talysis [| Up to K3] | | | | |
| C | D4: E | Examine the charac | cteristics of | of adsorptio | n and catalysis | | [] | Up to K4] | | | | |
| C | $\mathbf{D5:} \begin{bmatrix} A \\ A \end{bmatrix}$ | apply the order and | d molecul | arity of the | reaction and der | ivation of orc | ler of | Up to K4] | | | | |
| | J5 . tl | ne reactions | | | | | L | 0p to K4] | | | | |
| | CO 8 | DO Monsing | | | | | | | | | | |
| Г | | PO Mapping: | | | D | | . . | | | | | |
| | Cou | rse Outcomes | | | Programme O | | | | | | | |
| ┝ | | (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | | | |
| | | CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

Academic Council Meeting Held On 17.05.2022

CO 2

CO 3

CO 4

CO5

Weightage

LESSON PLAN

| Unit | Course Name | Hrs | Pedagogy |
|------|---|-----|------------------------------------|
| Ι | GASEOUS STATE Characteristics of Gases and its parameters. Gas laws- Boyle's law, Charles's law, The Combined Gas law, Gay Lussac's law, Avogadro's law and the Ideal Gas equation. Postulates of kinetic theory gases – Derivation of ideal gas laws from the expression on the basis of kinetic theory of gases – Maxwell – Boltzmann law of distribution of velocities (Derivation not necessary) graphical representation – Effect of temperature on various velocities – Experimental verification of Maxwell's law. Different types of molecular velocities– Average Velocity, Most Probable Velocity, Average Velocity and their calculations-Principle of equipartition of energy. | 12 | Chalk, Talk & Power point |
| II | COLLOIDAL STATE Introduction– Distinction between true solution, colloidal dispersion and suspension – classification of colloids. Difference between Lyophilic and Lyophobic colloids. Purification of colloids- Dialysis and Ultrafiltration. Properties of colloids-Tyndall effect, Sedimentation, Electrophoresis. Origin of Charge on Colloids- Hardy – Schulze law. Protection of Colloids – Gold Number. Application of colloids in foods, medicines, industrial goods, sewage disposal, clarification of water, smoke screens and detergent action of soap. | 12 | Chalk, Talk & Power point |
| III | ADSORPTION Definition – Adsorption, adsorbent, adsorbate & occlusion - types of adsorptions - Differences between physisorption and chemisorption- Langmuir's and Freundlich adsorption isotherms, positive and negative adsorption, Adsorption of gases on solids - characteristics of adsorption of gases on solids - factors influencing adsorption – adsorption isotherm – BET (Elementary idea only) – Applications of adsorption in gas masks, chromatography, cleaning of sugars, paint industry, catalysis and adsorption indicators. | 12 | Chalk, Talk & Power point |
| IV | CATALYSIS Catalysis – Definition – Characteristics – Types of catalysts – positive – negative - auto and induced catalyst-Theories of catalysis –The Intermediate Compound Formation theory & The Adsorption theory- Action of Promoters and Poisons with suitable examples. Enzyme Catalysis –characteristic features-Mechanism – Michaelis - Menten equation. | 12 | Chalk, Talk & Power point |
| V | CHEMICAL KINETICS Introduction – Rate of Reaction – Rate law and Rate constant – Order and Molecularity of a reaction. Derivation of rate equation and half-life period for first order- examples- Catalytic Decomposition of hydrogen peroxide – Decomposition of Dinitrogen pentoxide. Pseudo unimolecular reaction - Derivation of rate equation and half-life period. examples- inversion of cane sugar and hydrolysis of ester by acid. second, third and zero order reactions – examples – rate equation – half | 12 | Chalk, Talk & Power point |

| period (no derivation required). Methods for the determination of the | |
|---|--|
| order of a reaction. Influence of temperature on the rate of reaction - | |
| Arrhenius rate equation and its significance. Collision Theory of | |
| Reaction Rate and its limitations. | |

Course Designed by: Dr. V. Ramasamy Raja & Dr. A. J. Sunija

| | Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print | | | | | | | | | | | |
|------|--|---------------------------------------|----------------------|--------------|----------------------|--------------|-----------|-------------------|--|--|--|--|
| | Articulation Mapping – K Levels with Course Outcomes (COs) | | | | | | | | | | | |
| | | | Sectio | on A | Section | B | Section C | | | | | |
| Inte | Cos | K Level | MC | Qs | Short Ans | swers | Either or | Section D Open | | | | |
| rnal | COS | K Levei | No. of. Questions | K – Level | No. of. Questions | K - Level | Choice | Choice | | | | |
| CI | CO1 | Up to K2 | 2 | K1&K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | | |
| AI | CO2 | Up to K3 | 2 | K1&K2 | 2 | K2 | 2 (K3&K3) | 2(K2&K3) | | | | |
| CI | CO3 | Up to K2 | 2 | K1&K2 | 1 | K2 | 2 (K2&K2) | 1(K2) | | | | |
| AII | CO4 | Up to K4 | 2 | K1&K2 | 2 | K2 | 2 (K3&K3) | 2(K3&K4) | | | | |
| | | No. of Questions to be asked | 4 | | 3 | | 4 | 3 | | | | |
| Pat | stion tern | No. of Questions to be answered | 4 | | 3 | | 2 | 2 | | | | |
| CIA | I & II | Marks for each question | 1 | | 2 | | 5 | 10 | | | | |
| | | Total Marks for each section | 4 | | 6 | | 10 | 20 | | | | |

| | | Dist | ribution of 1 | Marks with | K Level C | IA I & (| CIA II | |
|------|------------|--|---|---|-------------------------------|----------------|--------------------------------------|---------------------|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % |
| | K1 | 2 | 2 | - | - | 4 | 6.67 | |
| | K2 | 2 | 4 | 10 | 20 | 36 | 60 | 67 |
| CI | K3 | - | - | 10 | 10 | 20 | 33.33 | 33 |
| AI | K4 | - | - | - | - | - | - | - |
| | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 |
| | K1 | 2 | 2 | - | - | 4 | 6.67 | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 43.33 | 50 |
| CI | K3 | - | - | 10 | 10 | 20 | 33.33 | 33 |
| A II | K4 | - | - | - | 10 | 10 | 16.67 | 17 |
| | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 |

K1- Remembering and recalling facts with specific answers

 $\ensuremath{\mathbf{K2}}\xspace$ Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

| S | Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs) | | | | | | | | | |
|-----------------------------------|---|---------------|---------------------|--------------|--------------------|--------------|----------------------------|------------------|--|--|
| | | | MC | | Short Answers | | Section C | Section D | | |
| S.No | Cos | K - Level | No. of Questions | K – Level | No. of Question | K – Level | (Either / or Choice) | (Open Choice) | | |
| 1 | CO1 | Up to K 2 | 2 | K1,K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | |
| 2 | CO2 | Upto K 3 | 2 | K1&K2 | 1 | K1 | 2 (K3&K3) | 1(K3) | | |
| 3 | CO3 | Up to K 3 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K3) | | |
| 4 | CO4 | Up to K 4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | | |
| 5 | CO5 | Up to K 4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | | |
| No. of | Questions | s to be Asked | 10 | | 5 | | 10 | 5 | | |
| No.of Questions to be answered | | 10 | | 5 | | 5 | 3 | | | |
| Marks for each question | | | 1 | | 2 | | 5 | 10 | | |
| Total Marks for each section | | | 10 | | 10 | | 25 | 30 | | |
| | (Figures | in parenthes | sis denotes, q | uestions s | hould be as | ked with | the given K | level) | | |

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| | | D | istribution of | Marks with | K Level | | |
|---------------------|--|---|-------------------------------------|--------------------------------|----------------|--------------------------------------|-------------------|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % |
| K1 | 5 | 4 | - | - | 9 | 7.5 | 33 |
| K2 | 5 | 6 | 10 | 10 | 31 | 25.83 | |
| K3 | - | - | 40 | 20 | 60 | 50 | 50 |
| K4 | - | - | - | 20 | 20 | 16.67 | 17 |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 |
| NB: Hig of K lev | · · | erformance o | of the students | s is to be asso | essed by a | attempting | higher level |

| Section | A (Mu | Itiple Cho | ice Questions) |
|----------|---------|-------------|--|
| Answe | r All Q | uestions | (10x1=10 marks) |
| Q.No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| Section | B (Sho | ort Answei | rs) |
| Answe | r All Q | uestions | (5x2=10 marks) |
| Q.No | CO | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| Section | C (Eit | her/Or Ty | pe) |
| Answe | r All Q | uestions | $(5 \times 5 = 25 \text{ marks})$ |
| Q.No | CO | K Level | Questions |
| 16) a | CO1 | K2 | |
| 16) b | CO1 | K2 | |
| 17) a | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K3 | |
| 19) b | CO4 | K3 | |
| 20) a | CO5 | K3 | |
| 20) b | CO5 | K3 | |
| NB: Hi | gher le | vel of perf | ormance of the students is to be assessed by attempting higher |
| level of | | | |
| Section | D (Op | en Choice | |
| Answe | r Any T | Three ques | tions (3x10=30 marks) |
| Q.No | CO | K Level | Questions |
| 21 | CO1 | K2 | |
| 22 | CO2 | K3 | |
| 23 | CO3 | K3 | |
| 23 | | | |
| 23 | CO4 | K4 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | INORGANIC CHEMISTRY – II | | | | | | | | |
|--------------------|--|---|---|---|--|--|--|--|--|
| Course Code | 21UCHC32 L | | | | | | | | |
| Category | Core | 4 | - | 4 | | | | | |
| Nature of cours | Nature of course: EMPLOYABILITY & SKILL ORIENTED & ENTREPRENURSHIP | | | | | | | | |
| Course Objectives: | | | | | | | | | |

- To Recall the general characteristics of s-, p- block elements and its basic properties.
- To Remember the electronic configurations of the elements and naming the coordination compounds.
- To Compare the role of transition elements in coordination compounds.
- To Execute the structure, preparation and properties of important compounds.
- To Determine the properties and uses of the elements in biological systems and EAN rule.

Unit: Is - Block Elements12Group 1 Elements: Alkali Metals – general characteristics – atomic and ionic radii – ionizationenergies – electropositive character – chemical properties – complexes of alkali metals – comparisonof lithium with other members of the family – resemblance of lithium and magnesium – role of Na⁺and K⁺ ions in biological systems – sodium pump.

Group 2 Elements: Alkaline Earth Metals – general characteristics – atomic and ionic radii – ionization energies – chemical properties – comparison of beryllium with other elements of Group 2 – properties and uses of alkaline earth metals – Portland cement – role of Mg^{2+} and Ca^{2+} ions in biological systems.

Unit: II p – Block Elements – I

Group 13 Elements: general characteristics - ionization energies – oxidation states – electropositive character – tendency to form ionic and covalent compounds – diagonal relationship between boron and silicon – properties of elements – relative strengths of trihalides as Lewis acids – borides – boron hydrides – boranes – preparation, properties and structure of diborane – bonding in boranes. Group 14 Elements: general characteristics – ionization energy – tendency to form chains, catenation – properties and structure of allotropes of carbon – Structure, preparation and properties of Nickel, Cobalt and Iron carbonyls, silicates and silicons – types of silicates – zeolites.

Unit: III p – Block Elements – II

12

12

Group 15 Elements: general characteristics – metallic and non – metallic character – variation in physical state – anomalous properties of nitrogen – allotropic forms of phosphorus – marsh test – preparation and properties of urotropine. **Group 16 Elements**: general characteristics – oxidation states – anomalous behaviour of oxygen – structure and properties of ozone – allotropes of sulphur – preparation and properties of sulphuric acid, caros's acid, marshall's acid. **Group 17 Elements**: general characteristics – electron affinity – oxidation states - preparation and properties of chlorine – oxoacids of halogens – interhalogen compounds. **Group 18 Elements**: occurrence – general characteristics – general physical properties of noble gases – structure and shape of XeF₆, XeOF₄, XeO₂F₂ and XeO₂F₄ molecules.

Unit: IV | COORDINATIN COMPOUNDS – I

Double salts – coordination compounds – coordination complexes and complex ions – coordination number – unidentate, bidentate and polydentate ligands, chelating ligands and chelates – Werner's theory – Nomenclature of coordination compounds – EAN rule – stability of complex ions - factors

Academic Council Meeting Held On 17.05.2022

12

| affecti | ng the stability of a complex ion – isomerism in coordination compounds: structu | ural isomerism | | | | |
|---|--|---|--|--|--|--|
| – link | age isomerism, coordination position isomerism, ionization isomerism, hydrat | e isomerism - | | | | |
| stereo | isomerism – geometrical isomerism, optical isomerism. | | | | | |
| Unit: | · · · | 12 | | | | |
| Valence bond theory – shortcomings of valence bond theory – the crystal field theory – crystal field | | | | | | |
| | ng of energy levels – crystal field stabilization energy (CFSE) – factors in | | | | | |
| | tude of crystal field splitting – colour of transition metal complexes – ligand | | | | | |
| | ce of covalent bonding in metal ligand bonding – molecular orbital theory o | | | | | |
| | exes – pi bonding in octahedral complexes – sigma bonding in tetrahedral comp | | | | | |
| - | bonding in square planar complexes. | U | | | | |
| ···· r | Total Lecture Ho | ours 60 Hrs | | | | |
| Books | for Study: | ł | | | | |
| | R. Puri, L. R. Sharma, K. C. Kalia, Principles of Inorganic Chemistry, Vishal P | ublishing Co. | | | | |
| | har, Delhi, 2018. | U | | | | |
| Books | for Reference: | | | | | |
| 4. J. E | E. Huheey, E. A. Kieter and R. L. Keiter, Inorganic Chemistry, 4th ed., Harper | Collins, New | | | | |
| York, | | | | | | |
| 5. F. A | A. Cotton, G. Wilkinson, C. Murillo and M. Bochman, Advanced Inorganic Che | mistry 6th ed | | | | |
| John V | | mou j,ou ou. | | | | |
| | Viley, New York, 1999. | nnser y,our ea. | | | | |
| | Viley, New York, 1999. Moeller, Inorganic Chemistry: A Modern Introduction, Wiley, New York, 1990. | inistry,oth ed. | | | | |
| 6. T. I | | inistry,our ea. | | | | |
| 6. T. I 7. R. I | Moeller, Inorganic Chemistry: A Modern Introduction, Wiley, New York, 1990. | | | | | |
| 6. T. M 7. R. I Web I | Moeller, Inorganic Chemistry: A Modern Introduction, Wiley, New York, 1990. D Madan S.Chand, Modern Inorganic Chemistry band Co.Ltd, New Delhi 2012. Resources: | | | | | |
| 6. T. N 7. R. I Web I 1. <u>httr</u> | Moeller, Inorganic Chemistry: A Modern Introduction, Wiley, New York, 1990. D Madan S.Chand, Modern Inorganic Chemistry band Co.Ltd, New Delhi 2012. Resources: bs://youtu.be/1uJk4K_irP8 | | | | | |
| 6. T. N 7. R. I Web I 1. <u>httr</u> 2. <u>httr</u> | Moeller, Inorganic Chemistry: A Modern Introduction, Wiley, New York, 1990. D Madan S.Chand, Modern Inorganic Chemistry band Co.Ltd, New Delhi 2012. Resources: | | | | | |
| 6. T. N 7. R. I Web I 1. http 2. http 3. http | Moeller, Inorganic Chemistry: A Modern Introduction, Wiley, New York, 1990. D Madan S.Chand, Modern Inorganic Chemistry band Co.Ltd, New Delhi 2012. Resources: ps://youtu.be/1uJk4K_irP8 ps://youtu.be/xQJOfAKgSOY | K Level | | | | |
| 6. T. M 7. R. I Web I 1. http 2. http 3. http Cours | Moeller, Inorganic Chemistry: A Modern Introduction, Wiley, New York, 1990. D Madan S.Chand, Modern Inorganic Chemistry band Co.Ltd, New Delhi 2012. Resources: ps://youtu.be/1uJk4K_irP8 ps://youtu.be/xQJOfAKgSOY ps://youtu.be/xMjJxjhJWj4 | | | | | |
| 6. T. M 7. R. I Web I 1. http 2. http 3. http Cours | Moeller, Inorganic Chemistry: A Modern Introduction, Wiley, New York, 1990. D Madan S.Chand, Modern Inorganic Chemistry band Co.Ltd, New Delhi 2012. Resources: ps://youtu.be/1uJk4K_irP8 ps://youtu.be/xQJOfAKgSOY ps://youtu.be/xMjJxjhJWj4 e Outcomes: | | | | | |
| 6. T. N 7. R. I Web I 1. http 2. http 3. http Cours On th CO1: | Moeller, Inorganic Chemistry: A Modern Introduction, Wiley, New York, 1990. D Madan S.Chand, Modern Inorganic Chemistry band Co.Ltd, New Delhi 2012. Resources: ps://youtu.be/1uJk4K irP8 ps://youtu.be/xQJOfAKgSOY ps://youtu.be/xMjJxjhJWj4 e Outcomes: ne completion of the course the student will be able to | K Level | | | | |
| 6. T. N 7. R. I Web I 1. http 2. http 3. http Cours On th CO1: | Moeller, Inorganic Chemistry: A Modern Introduction, Wiley, New York, 1990. D Madan S.Chand, Modern Inorganic Chemistry band Co.Ltd, New Delhi 2012. Resources: ps://youtu.be/1uJk4K_irP8 ps://youtu.be/xQJOfAKgSOY ps://youtu.be/xMjJxjhJWj4 e Outcomes: the completion of the course the student will be able to Relate the general characteristics of s-block, p-block elements. | K Level | | | | |
| 6. T. M 7. R. I Web I 1. http 2. http 3. http Cours On th | Moeller, Inorganic Chemistry: A Modern Introduction, Wiley, New York, 1990. D Madan S.Chand, Modern Inorganic Chemistry band Co.Ltd, New Delhi 2012. Resources: ps://youtu.be/1uJk4K_irP8 ps://youtu.be/xQJOfAKgSOY ps://youtu.be/xMjJxjhJWj4 e Outcomes: the completion of the course the student will be able to Relate the general characteristics of s-block, p-block elements. Understand the concepts of important compounds of s-, p- block and naming | K Level | | | | |
| 6. T. N 7. R. I Web I 1. http 2. http 3. http 3. http Cours On th CO1: CO2: CO3: | Moeller, Inorganic Chemistry: A Modern Introduction, Wiley, New York, 1990. D Madan S.Chand, Modern Inorganic Chemistry band Co.Ltd, New Delhi 2012. Resources: DS://voutu.be/1uJk4K_irP8 DS://voutu.be/xQJOfAKgSOY DS://voutu.be/xMjJxjhJWj4 e Outcomes: The completion of the course the student will be able to Relate the general characteristics of s-block, p-block elements. Understand the concepts of important compounds of s-, p- block and naming the coordination compounds. | K Level [Up to K2] [Up to K3] [Up to K3] | | | | |
| 6. T. N 7. R. I Web I 1. http 2. http 3. http Course On th CO1: CO2: | Moeller, Inorganic Chemistry: A Modern Introduction, Wiley, New York, 1990. D Madan S.Chand, Modern Inorganic Chemistry band Co.Ltd, New Delhi 2012. Resources: ps://youtu.be/1uJk4K_irP8 ps://youtu.be/xQJOfAKgSOY ps://youtu.be/xMjJxjhJWj4 e Outcomes: te completion of the course the student will be able to Relate the general characteristics of s-block, p-block elements. Understand the concepts of important compounds of s-, p- block and naming the coordination compounds. Compare the isomerism of coordination compounds. | K Level [Up to K2] [Up to K3] | | | | |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | |
|------------------------|--------------------------|-------------|-------------|------|-------------|-------------|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | |
| CO5 | 2 | 3 | 1 | 3 | 2 | 1 | | |
| Weightage | 11 | 10 | 9 | 11 | 9 | 11 | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| UNIT | INORGANIC CHEMISTRY – II | Hrs | Mode |
|------|---|-----|------------------------------------|
| I | s – BLOCK ELEMENTS Group 1 Elements: Alkali Metals – general characteristics – atomic and ionic radii – ionization energies – electropositive character – chemical properties – complexes of alkali metals – comparison of lithium with other members of the family – resemblance of lithium and magnesium – role of Na ⁺ and K ⁺ ions in biological systems – sodium pump. Group 2 Elements: Alkaline Earth Metals – general characteristics – atomic and ionic radii – ionization energies – chemical properties – comparison of beryllium with other elements of Group 2 – properties and uses of alkaline earth metals – Portland cement – role of Mg ²⁺ and Ca ²⁺ ions in biological systems. | 12 | Chalk & Talk, Power Point |
| Π | p – BLOCK ELEMENTS Group 13 Elements: general characteristics - ionization energies – oxidation states – electropositive character – tendency to form ionic and covalent compounds – diagonal relationship between boron and silicon – properties of elements – relative strengths of trihalides as Lewis acids – borides – boron hydrides – boranes – preparation, properties and structure of diborane – bonding in boranes. Group 14 Elements: general characteristics – ionization energy – tendency to form chains, catenation – properties and structure of allotropes of carbon – Structure, preparation and properties of Nickel, Cobalt and Iron carbonyls, silicates and silicones – types of silicates – zeolites. | 12 | Chalk & Talk, Power Point |
| III | p – BLOCK ELEMENTS – II Group 15 Elements: general characteristics – metallic and non – metallic character – variation in physical state – anomalous properties of nitrogen – allotropic forms of phosphorus – marsh test – preparation and properties of urotropine. Group 16 Elements: general characteristics – oxidation states – anomalous behaviour of oxygen – structure and properties of ozone – allotropes of sulphur – preparation and properties of sulphuric acid, caros's acid, marshall's acid. Group 17 Elements: general characteristics – electron affinity – oxidation states - preparation and properties of chlorine – oxoacids of halogens – interhalogen compounds. Group 18 Elements: occurrence – general characteristics – general physical properties of noble gases – structure and shape of XeF₆, XeOF₄, XeO₂F₂ and XeO₂F₄ molecules. | 12 | Chalk & Talk, Power Point |
| IV | COORDINATION COMPOUNDS – I Double salts – coordination compounds – coordination complexes and complex ions – coordination number – unidentate, bidentate and polydentate ligands, chelating ligands and chelates – Werner's theory – Nomenclature of coordination compounds – EAN rule – stability of complex | 12 | Chalk & Talk, Power Point |

| | ions - factors affecting the stability of a complex ion – isomerism in coordination compounds: structural isomerism – linkage isomerism, coordination position isomerism, ionization isomerism, hydrate isomerism - stereo isomerism – geometrical isomerism, optical isomerism. | | |
|---|---|----|------------------------------------|
| V | COORDINATION COMPOUNDS – II Valence bond theory – shortcomings of valence bond theory – the crystal field theory – crystal field splitting of energy levels – crystal field stabilization energy (CFSE) – factors influencing the magnitude of crystal field splitting – colour of transition metal complexes – ligand field theory – evidence of covalent bonding in metal ligand bonding – molecular orbital theory of coordination complexes – pi bonding in octahedral complexes – sigma bonding in tetrahedral complexes – sigma and pi bonding in square planar complexes. | 12 | Chalk & Talk, Power Point |

Course Designed by: Dr. K. Muthupandi & Dr. V. Ramasamy Raja

| | | | rning Outcon Formativ ion Mapping | ve Examina | tion - Blue P | rint | | |
|--------------|------------|---------------------------------------|---|--------------|----------------------------|------------------|---------------------|----------------|
| Inte | | | Section A MCQs | | Section B Short Answers | | Section C | Section D |
| rnal | Cos | K Level | No. of. Questions | K – Level | No. of. Questions | K - Leve l | Either or Choice | Open Choice |
| CI | CO1 | Up to K2 | 2 | K1&K2 | 1 | K1 | 2 (K2&K2) | 1(K2) |
| AI | CO2 | Up to K3 | 2 | K1&K2 | 2 | K2 | 2 (K3&K3) | 2(K2 & K3) |
| CI | CO3 | Up to K2 | 2 | K1&K2 | 1 | K2 | 2 (K2&K2) | 1(K2) |
| AII | CO4 | Up to K4 | 2 | K1 & K2 | 2 | K2 | 2 (K3&K3) | 2(K3 &K4) |
| | | No. of Questions to be asked | 4 | | 3 | | 4 | 3 |
| Ques Patt | | No. of Questions to be answered | 4 | | 3 | | 2 | 2 |
| CIA | | Marks for each question | 1 | | 2 | | 5 | 10 |
| | | Total Marks for each section | 4 | | 6 | | 10 | 20 |

| | | Dist | ribution of] | Marks with | K Level C | IAI&(| CIA II | |
|-----------|------------|--|---|---|-------------------------------|----------------|--------------------------------------|---------------------|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % |
| | K1 | 2 | 2 | - | - | 4 | 6.67 | 67 |
| | K2 | 2 | 4 | 10 | 20 | 36 | 60 | 07 |
| CIA | K3 | - | - | 10 | 10 | 20 | 33.33 | 33 |
| I | K4 | - | - | - | - | - | - | - |
| - | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 |
| | K1 | 2 | 2 | - | - | 4 | 6.67 | 50 |
| | K2 | 2 | 4 | 10 | 10 | 26 | 43.33 | 50 |
| CIA II | K3 | - | - | 10 | 10 | 20 | 33.33 | 33 |
| | K4 | - | - | - | 10 | 10 | 16.67 | 17 |
| | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| S | ummativ | ve Examinatio | | rint Articu Dutcomes | | ping – K | Level with C | Course |
|-----------------------------------|------------------------------|---------------|-------------------------|-------------------------|--------------------|--------------|--------------------------------------|-------------------------------|
| | | | MCQs | | Short Answers | | Section C | C D |
| S.No | COs | K - Level | No. of Question s | K – Level | No. of Question | K – Level | Section C (Either / or Choice) | Section D (Open Choice) |
| 1 | CO1 | Up to K2 | 2 | K1,K2 | 1 | K1 | 2 (K2&K2) | 1(K2) |
| 2 | CO2 | Up to K3 | 2 | K1&K2 | 1 | K1 | 2 (K3&K3) | 1(K3) |
| 3 | CO3 | Up to K3 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K3) |
| 4 | CO4 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) |
| 5 | CO5 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) |
| No. of | No. of Questions to be Asked | | | | 5 | | 10 | 5 |
| No.of Questions to be answered | | | 10 | | 5 | | 5 | 3 |
| Mar | Marks for each question | | | | 2 | | 5 | 10 |
| Total N | Total Marks for each section | | | | 10 | | 25 | 30 |
| | (Figures | in parenthesi | is denotes, q | uestions s | hould be as | ked with | the given K l | evel) |

| | Distribution of Marks with K Level | | | | | | | | |
|------------|---|---|-------------------------------------|-------------------------------|----------------|--------------------------------------|-------------------|--|--|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % | | |
| K1 | 5 | 4 | - | - | 9 | 7.5 | 22 | | |
| K2 | 5 | 6 | 10 | 10 | 31 | 25.83 | 33 | | |
| K3 | - | - | 40 | 20 | 60 | 50 | 50 | | |
| K4 | - | - | - | 20 | 20 | 16.67 | 17 | | |
| Marks | Marks 10 10 50 50 120 100 100 | | | | | | | | |
| | NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels. | | | | | | | | |

| | - | uestions | (10x1=10 marks) |
|-------|---------------|------------|--|
| Q.No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| | | ort Answer | |
| | - | uestions | (5x2=10 marks |
| Q.No | CO | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| | | her/Or Ty | - |
| | | uestions | (5 x 5 = 25 marks) |
| Q.No | CO | K Level | Questions |
| 16) a | CO1 | K2 | |
| 16) b | CO1 | K2 | |
| 17) a | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K3 | |
| 19) b | CO4 | K3 | |
| 20) a | CO5 | K3 | |
| 20) b | CO5 | K3 | |
| | | | ormance of the students is to be assessed by attempting higher |
| | <u>K leve</u> | | |
| | | en Choice | |
| | | Three ques | |
| Q.No | CO | K Level | Questions |
| 21 | CO1 | K2 | |
| 22 | CO2 | K3 | |
| 23 | CO3 | K3 | |
| 24 | CO4 | K4 K4 | |
| 25 | CO5 | | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Na | | /Iaj Vol | - | | | | - | | actic s) | al – | II | I | | | | | | | | | | | | | | | | |
|--------------|--------------------------|-------------|------|-------------|-------------|-----|--------------|-----------------------|-------------|----------|----|-----|------|------|-----|------|------|-----|------|-----|-------|-----|-----|----------|------|-----|----|---|
| Course Co | | 21U | | | | | | - J ~- | ~) | | | | | | | | | | | | | | | | L | Р | | С |
| Category | C | Core | e l | Pr | ıcti | cal | l | | | | | | | | | | | | | | | | | | - | 2 | | - |
| Nature of co | ourse: |] | EN | 1P : | LO | YA | BI | LII | Y | √ | | ŝ | KI | LL | 0 | RIE | ENT | ΓEI |) | | EN | TR | EP | REN | IURS | HIP | | |
| Course Ob | jective | es: | | | | | | | | | | 1 | | | | | | | | | | | | | | | | |
| | recollec | | | | - | | | | • | | - | | | | | | | | - | | | | | | | | | |
| | rememt | | | | | | | | | | • | | | | | | | | | | | | ons | • | | | | |
| | compar execute | | | | | - | | | | | | | | | | | | | | 10 | wate | er. | | | | | | |
| | determi | | | | - | | - | | 0 | | | • | | | | mc | /110 | | | | | | | | | | | |
| UNIT | Theor | ry c | of | Vo | lur | net | t ric | : Aı | nalysi | s an | d | ١I | ist | of | 'Ex | | | | | | | | | | | Hr | S | |
| Ŧ | Theor | • | | | | | | | • | | | | | | | • | | | • | | | | | <u> </u> | | | | |
| Ι | Soluti and ch | | | | | | | | | ty, I | M | 10. | alit | ty. | H | anc | 1111 | ıg | 01 8 | app | aratu | 18, | gla | SSW | ares | | 6 | |
| II | List o | | | | | | | | | | | | | | | | | | | | | | | | | | 24 | |
| | I. Aci | dim | net | ry | and | 1 A | lka | lim | netry | | | | | | | | | | | | | | | | | | | |
| | 1. Esti | ima | atio | n | of] | Na | $_2$ CC | D ₃ | | | | | | | | | | | | | | | | | | | | |
| | 2. Esti | ima | atio | n | of] | Na | OH | [/ K | ΚОН | | | | | | | | | | | | | | | | | | | |
| | 3. Esti | ima | atio | n | of |)Xa | alic | aci | d. | | | | | | | | | | | | | | | | | | | |
| | II. Ree | dox | хT | itr | atic | ons | | | | | | | | | | | | | | | | | | | | | | |
| | a. Per | mai | ng | ano | om | etr | У | | | | | | | | | | | | | | | | | | | | | |
| | 1. | Est | stin | ıat | ion | of | fer | rou | is ion | | | | | | | | | | | | | | | | | | | |
| | 2. | Est | stin | ıat | ion | of | ox | alic | acid | | | | | | | | | | | | | | | | | | | |
| | 3. | Est | stin | ıat | ion | of | cal | lciu | m (di | rect | m | ne | ho | d) | | | | | | | | | | | | | | |
| | b. Dic | chro | om | etr | у | | | | | | | | | | | | | | | | | | | | | | | |
| | 1. | Est | stin | ıat | ion | of | fer | rou | is ion | | | | | | | | | | | | | | | | | | | |
| | 2. | Est | stin | ıat | ion | of | fer | ric | ion u | sing | ey | ext | ern | al | ind | lica | ato | r | | | | | | | | | | |
| | V. ED | DTA | 4 7 | ìtr | atio | on | | | | | | | | | | | | | | | | | | | | | | |
| | 1. | E | Esti | ma | ıtio | n c | of H | Iarc | lness | of w | at | te | us | sing | g E | D | ГA | • | | | | | | | | | | |
| | <u>Distri</u> | ibut | tic | <u>n (</u> | <u>əf 1</u> | na | rks | 5 | | | | | | | | | | | | | | | | | | | | |
| | Max I Intern marks | nal | | | | | KS | | | | | | | | | | | | | Ex | erna | al | : 6 | 0 | | | | |

| Laboratory Performance | : | 30 marks | Vivo voce | : | 5 mark | (S |
|---|---|----------|-----------------------|---|--------|-----|
| Observation note book | : | 10 marks | Record note book | : | 10 mai | rks |
| | - | | Procedure writing | : | 15 mai | rks |
| | | | Volumetric estimation | : | 30 mai | rks |
| Total | : | 40 marks | Total | : | 60 mai | rks |
| | | | | | | |
| For Volumetric Estimation i Less than 2% | | | 0 marks | | | |
| | | ror - 3 | 0 marks 5 marks | | | |

15 marks

10 marks

Books for Study:

1. Vogel, Text book of Inorganic quantitative analysis, Longman Sc & Tech, 2008.

Books for References:

1. Jeyavathana Samuel, Chemistry Practical Book, G.G.Printers, Chennai, 2012.

3-5% Error

Greater than 5%

2. Vickie. M.Williamson, M.Larry Peck, Lab manual for General Chemistry, Cengage Learning India

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Private Limited, New Delhi, 2009.

Web Resources:

1. https://youtu.be/xQDQNghs5dc

2. https://youtu.be/AdbK86BnXN8

3. https://youtu.be/dmnElKapQ00

| e Outcomes: | K Level | | | | | | |
|---|---|--|--|--|--|--|--|
| On the completion of the course the student will be able to | | | | | | | |
| Discuss the theory of safety measures in chemistry laboratory. | [Up to K2] | | | | | | |
| Understand the quantitative analysis in practical chemistry. | [Up to K3] | | | | | | |
| Apply the theory on quantitative titration methods. | [Up to K3] | | | | | | |
| Analyze the titrated values in tabular format. | [Up to K4] | | | | | | |
| CO4:Analyze the titrated values in tabular format.[Up to K4]CO5:Construct the estimated value of the given compounds.[Up to K4] | | | | | | | |
| | e completion of the course the student will be able to Discuss the theory of safety measures in chemistry laboratory. Understand the quantitative analysis in practical chemistry. Apply the theory on quantitative titration methods. Analyze the titrated values in tabular format. | | | | | | |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | | | |
|------------------------|--------------------------|-------------|-------------|------|------|------|--|--|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | | | |
| CO 1 | 2 | 1 | 2 | 3 | 3 | 2 | | | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | | | |
| CO5 | 2 | 3 | 1 | 3 | 2 | 1 | | | | |
| Weightage | 10 | 10 | 9 | 11 | 10 | 11 | | | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| UNIT | Theory of Volumetric Analysis and Laboratory Safety Measures | Hrs | Mode |
|------|---|-----|-----------|
| Ι | Theory of Volumetric Analysis and Laboratory Safety Measures: Strength of Solutions – Normality, Molarity, Molality. Handling of apparatus, glasswares and chemicals – Safety aspects | 6 | |
| | List of Experiments | | |
| II | I. Acidimetry and Alkalimetry 1. Estimation of Na₂CO₃ 2. Estimation of NaOH / KOH 3. Estimation of oxalic acid. II. Redox Titrations a. Permanganometry 1. Estimation of ferrous ion 2. Estimation of oxalic acid 3. Estimation of calcium (direct method) b. Dichrometry 1. Estimation of ferrous ion 2. Estimation of ferrous ion 3. Estimation of ferrous ion 4. Estimation of ferric ion using external indicator V. EDTA Titration 1. Estimation of Hardness of water using EDTA. | 24 | Practical |

Course Designed by: Dr. Ramasamy Raja & Dr. K. Muthupandi



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Na | me A | ALI | LIED MATHEMATICS | – I | | | | | | | |
|--|---|---|---|--|----------------------|--------|--------------|----------|--|--|--|
| Course Co | de 2 | 21U | MCA32 | | | L | Р | С | | | |
| Category | A | ALI | LIED | | | 6 | - | 4 | | | |
| Nature of o | course: | | EMPLOYBILITY | SKILL ORIENTED | ENTREP | RENI | JRS | HIP | | | |
| COURSE | OBJEC | CTIV | /ES: | | | | | | | | |
| ToToTo | develop teach tr develop apply a | op sk trigo op th and | e with the concepts of the cills in solving equations phometry and Expressing ' e skills in expanding Trig prove trigonometric ident | Trigonometric functions onometric functions. ities. | | | | | | | |
| Unit: I | Theor coeffic | | | Equations - Relation betw | veen the roo | ts and | 1 | 8 hrs | | | |
| Unit: II | | | al Equations - Transforma | | | | 1 | 8 hrs | | | |
| Unit: III | | | nate solutions of Numeric Cardan's method | al Equations: Newton's M | ethod - Hor | ner's | 1 | 8 hrs | | | |
| Unit: IV | cos n <i>e</i> | rigonometry: Applications of Demoivre's Theorem - Expression for sin $n\theta$, os $n\theta$ and tan $n\theta$ - Expression of sin ⁿ θ and cos ⁿ θ - Expansion of sin θ , os θ and tan θ in powers of θ . 18 hrs | | | | | | | | | |
| Unit: V | | | ic Functions – Inverse Hy | perbolic Functions | | | 1 | 8 hrs | | | |
| | | | |] | Fotal Lecture | e Hour | rs 9 | 0 hrs | | | |
| Unit I : Unit II: Unit III: Unit III: | Gamm Chapter Chapte Chapte Chapte | na P er 1: er 1: er 1: er 4: | umugam and A.Thangapa ublishing House, Palayan Sections 1.1 & 1.2 Sections 1.3 & 1.4 Sections 1.5 (1), 1.5 (2) Sections 4.1, 4.2, 4.3 Sections 5.1, 5.2 | | nematics Pa | per I, | Nev | V | | | |
| Books for | Refere | ence | | | | | | | | | |
| Printers 2. T. K . M Printers | s Publis Ianicka Publish Tumuga | sher avas hers am | s Pvt. Ltd, Chennai, 2007 hagam Pillai and S.Naray Pvt. Ltd, Chennai, 2011. | anan, Algebra – Volume anan, Trigonometry, S.V ora, New Gamma Publishi | Viswanathan | | mko | ttai, | | | |
| | | | and com/2/jiticomethe | matics.com/www/conte/o | madratic o | anotia | ne/1 | 2. | | | |
| <u>rel</u> | ation-b | betv | | <u>nts-of-any-polynomial-ec</u> | | yuall | <u>/115/</u> | <u>_</u> | | | |

| Course | Outcomes: | K Level | | | | | |
|--|--|---------|--|--|--|--|--|
| After the completion of the course, Students will be able to | | | | | | | |
| CO1: | Learn and solve system of linear equations. | K3 | | | | | |
| CO2: | Develop and maintain problem solving skills in Numerical Equations. | K4 | | | | | |
| CO3: | Solve the exponential and trigonometric equations | K3 | | | | | |
| CO4: | Recognize the relationship between $\sin \theta$, $\cos \theta$ and $\tan \theta$. | К3 | | | | | |
| CO5: | Understand the ideas about the Hyperbolic functions and Inverse Hyperbolic Functions | K3 | | | | | |

CO & PO Mappings:

| COS | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
|-------------|-------------|------|-------------|-------------|------|------|
| CO 1 | 3 | 2 | 3 | 2 | 3 | 2 |
| CO 2 | 2 | 2 | 2 | 2 | 3 | 2 |
| CO 3 | 3 | 3 | 2 | 3 | 3 | 2 |
| CO 4 | 2 | 2 | 2 | 2 | 2 | 3 |
| CO 5 | 3 | 3 | 2 | 2 | 2 | 3 |

*3 –Advanced Application; 2 – Intermediate Development; 1 – Introductory Level

LESSON PLAN

| UNIT | COURSE NAME | Hrs | Pedagogy |
|------|---|-----|--------------------------------------|
| Ι | Theory of Equations: Formation of Equations - Relation between the roots and coefficients | 18 | Chalk & Talk, PPT |
| п | Reciprocal Equations - Transformation of Equations | 18 | Chalk & Talk, Group Discussion |
| III | Approximate solutions of Numerical Equations: Newton's Method - Horner's Method & Cardan's method | 18 | Chalk & Talk, LCD |
| IV | Trigonometry: Applications of Demoivre's Theorem - Expression for sin $n\theta$, cos $n\theta$ and tan $n\theta$ - Expression of sin ⁿ θ and cos ⁿ θ - Expansion of sin θ , cos θ and tan θ in powers of θ . | 18 | Chalk & Talk, Seminar |
| V | Hyperbolic Functions – Inverse Hyperbolic Functions | 18 | Chalk & Talk, Seminar |

Course designed by: Mr. A. Nambi Krishna and Dr. S. Suriyakala

| | Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs) | | | | | | | | | | | | | |
|--------------------------------|--|-----------------------------------|---------------------------------------|-------|---|-------|----------------------------------|--------------------------------|--|--|--|--|--|--|
| Internal | Cos | K Level | Section MC No. of. Questions | on A | Section Short An No. of. Questions | on B | Section C Either or Choice | Section D Open Choice | | | | | | |
| CI | CO1 | K3 | 2 | K1&K2 | 1 | K1 | 2(K3&K3) | 1 (K3) | | | | | | |
| AI | CO2 | K4 | 2 | K2&K2 | 2 | K2&K2 | 2(K4&K4) | 2 (K4) | | | | | | |
| CI | CO3 | K3 | 2 | K1&K2 | 1 | K1 | 2(K3&K3) | 2 (K3) | | | | | | |
| AII | CO4 | K3 | 2 | K2&K1 | 2 | K2&K2 | 2(K3&K3) | 1 (K3) | | | | | | |
| | | No. of stions to be asked | 4 | | 3 | | 4 | 3 | | | | | | |
| Question Pattern CIA I & | Que | No. of stions to be nswered | 4 | | 3 | | 2 | 2 | | | | | | |
| П | | ks for each uestion | 1 | | 2 | | 5 | 10 | | | | | | |
| | | l Marks for th section | 4 | | 6 | | 10 | 20 | | | | | | |

| | | Dist | ribution of 1 | Marks with | K Level C | IA I & (| CIA II | |
|-----|------------|--|---|---|-------------------------------|----------------|--------------------------------------|---------------------|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % |
| | K1 | 1 | 2 | - | - | 3 | 5 | 17 |
| | K2 | 3 | 4 | - | - | 7 | 11.67 | 17 |
| CIA | K3 | - | - | 10 | 10 | 20 | 33.33 | 33 |
| | K4 | - | - | 10 | 20 | 30 | 50 | 50 |
| - | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 |
| | K1 | 2 | 2 | - | - | 4 | 6.67 | 17 |
| | K2 | 2 | 4 | - | - | 6 | 10 | 1/ |
| CIA | K3 | - | - | 20 | 30 | 50 | 83.33 | 83 |
| II | K4 | - | - | - | - | - | - | - |
| | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| S | Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs) | | | | | | | | | | | |
|------------------------------|---|------------------|---------------------|--------------|--------------------|--------------|----------------------------|------------------|--|--|--|--|
| | | | MCC | | Short An | swers | Section C | Section D | | | | |
| S.No | COs | K - Level | No. of Questions | K – Level | No. of Question | K – Level | (Either / or Choice) | (Open Choice) | | | | |
| 1 | CO1 | K3 | 2 | K1&K2 | 1 | K1 | 2 (K3& K3) | 1 (K3) | | | | |
| 2 | CO2 | K4 | 2 | K1&K2 | 1 | K1 | 2 (K4 &K4) | 1 (K4) | | | | |
| 3 | CO3 | K3 | 2 | K1&K2 | 1 | K2 | 2 (K3& K3) | 1 (K3) | | | | |
| 4 | CO4 | К3 | 2 | K1&K2 | 1 | K2 | 2 (K3& K3) | 1 (K3) | | | | |
| 5 | CO5 | К3 | 2 | K1&K2 | 1 | K2 | 2 (K3 &K3) | 1 (K3) | | | | |
| No. | of Quest. Aske | ions to be ed | 10 | | 5 | | 10 | 5 | | | | |
| No. | No. of Questions to be answered | | 10 | | 5 | | 5 | 3 | | | | |
| Mar | Marks for each question | | 1 | | 2 | | 5 | 10 | | | | |
| Total Marks for each section | | 10 | | 10 | | 25 | 30 | | | | | |
| | (Figures in parenthesis denotes, questions should be asked with the given K level) | | | | | | | | | | | |

| | | Dis | tribution of | Marks with | n K Leve | l | |
|---------------------|--|---|-------------------------------------|--------------------------------|----------------|--------------------------------------|-------------------|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % |
| K1 | 5 | 4 | - | - | 9 | 7.5 | 17 |
| K2 | 5 | 6 | - | - | 11 | 9.17 | 1/ |
| K3 | - | - | 40 | 40 | 80 | 66.67 | 67 |
| K4 | - | - | 10 | 10 | 20 | 16.67 | 17 |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 |
| NB: Hig of K lev | , | erformance o | f the students | s is to be asse | essed by a | ttempting | higher level |

| | | | e Questions) |
|---------|----------|--------------|---|
| | · All Qu | | (10x1=10 marks) |
| Q.No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| | | rt Answers) | |
| | All Qu | | (5x2=10 marks) |
| Q.No | CO | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| Section | C (Eith | er/Or Type | |
| Answer | · All Qu | estions | (5 x 5 = 25 marks) |
| Q.No | CO | K Level | Questions |
| 16) a | CO1 | K3 | |
| 16) b | CO1 | K3 | |
| 17) a | CO2 | K4 | |
| 17) b | CO2 | K4 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K3 | |
| 19) b | CO4 | K3 | |
| 20) a | CO5 | K3 | |
| 20) b | CO5 | K3 | |
| NB: Hi | gher lev | el of perfor | mance of the students is to be assessed by attempting higher level of K |
| levels | | | |
| Section | D (Ope | n Choice) | |
| Answer | · Any Tl | hree questic | |
| Q.No | CO | K Level | Questions |
| 21 | CO1 | K3 | |
| 22 | CO2 | K4 | |
| 23 | CO3 | K3 | |
| 23 | | | |
| 23 | CO4 | K3 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | FUNDAMENTALS (| OF N | AICROBIOLOGY | | | | | |
|--------------------|---|----------|--------------------------|--------------|-------------------------|---|-------------|-----|
| Course Code | 21UMBA32 | | | | | | Р | C |
| Category | ALLIED MICROBIO | OLO | GY - I | | | 6 | - | 4 |
| Nature of cours | EMPLOYABILITY | | SKILL ORIENTED | \checkmark | ENTREPREN | URSH | ΗP | |
| Course Objecti | ives: | | | | | | | |
| | rstand history of microb | | | | ••• | | | |
| | y the basic morpholog | gy s | tructure, classification | n ar | nd biological | and e | econo | mic |
| - | nce of bacteria. | تم ام من | ionificance of Euroi | | | | | |
| - | pret the characteristics a ain the nomenclature and | | | | | | | |
| - | le the students to explor | | | 20- 2 | nd Protozoa | | | |
| | VELOPMENT OF MI | | | | | | 18 | 8 |
| | scope of Microbiology. 1 | | | | | eral n | | - |
| | nomenclature of Microo | | | | | | | |
| | imple and Compound m | - | - | ľ | 8, | | | |
| ** | CTERIOLOGY | | 1 | | | | 18 | 8 |
| General charact | eristics of Bacteria-Clas | ssific | ation, Ultra Structure- | Gra | m positive and | Gran | n | |
| negative cell wa | all, Reproduction, Biolog | gical | and Economic import | ance | e of <i>Bacillus, R</i> | hizob | ium, | |
| E.coli and Vibri | 0. | | | | | | | |
| | COLOGY | | | | | | 18 | 8 |
| | eristics of Fungi- Classi | | | - | | gical a | und | |
| | rtance of Saccharomyce | es, A | spergillus, Agaricus, H | Penic | cillium. | | - T | |
| | ROLOGY | | | | | | 18 | - |
| | eristics of Viruses-Class | | | | | | | |
| | Animal virus-(Pox and A | | | anc | i lambda) - An | tıvıral | - T | |
| | YCOLOGY AND PAI | | | | - le d'en D'ele | 1 | 18 | 8 |
| | eristics of Algae – Class | | | - | | - | | |
| - | rtance of <i>Chlorella</i> , <i>Spi</i> oduction of <i>Entamoeba I</i> | | • | roto | zoa - Classifica | uion, | Unra | L |
| | duction of Entamoeda r | nisio | iyiica, 1 iasmoaiam. | Tot | tal Lecture Ho | iirc | 90 H | Inc |
| Books for Stud | y: | | | 10 | | Juis | 70 I | 115 |
| 1 Prescott I | | n D / | A Microbiology 6/e | Mc | Graw Hill Publ | ishers | 200 | 6 |
| | I.J., Chan E.C.S. & Krei | | | | | | | |
| | v Delhi, 1993. | -8 | | | | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | .9 00 | •• |
| Books for refer | , | | | | | | | |
| 1. Ananthana | arayanan R & Jayaram F | Panic | ker, C.K., Textbook o | f M | icrobiology, C | rient | | |
| Longman, | | | | | | | | |
| • | Michael T., Martinko., J | | - | | | Brock | 's | |
| | f Microorganisms Glob | | | | | | | |
| | Y. Ingraham J.L. Wheol | | | he N | Aicrobial worl | d , 5th | n Ed. | |
| - | rks Cliffs N.J. Prentice H | Hall, | 1986. | | | | | |
| Web Resources | 5: | | | | | | | |
| | | | | | | | | |

| 1. <u>http</u> | s://www.britannica.com/science/microbiology | | | | | | |
|----------------|--|---------------|--|--|--|--|--|
| 2. <u>http</u> | 2. https://www.brainkart.com/article/Ultrastructure-of-a-Bacterial-cell_32841/ | | | | | | |
| 3. <u>http</u> | 3. https://www.toppr.com/guides/biology/biological-classification/kingdom-fungi/ | | | | | | |
| 4. <u>http</u> | s://www.toppr.com/guides/biology/plant-kingdom/algae/ | | | | | | |
| 5. <u>http</u> | <u>s://www.sciencedirect.com/topics/immunology-and-microbiology/virus-c</u> | lassification | | | | | |
| Course | Course Outcomes K Level | | | | | | |
| On Suc | On Successful Completion of Course the student will be able to | | | | | | |
| CO1: | Describe the knowledge and historical perspective of microbiology. | Up to K2 | | | | | |
| CO2: | Determine about the structure and classification of Bacteria. | Up to K3 | | | | | |
| CO3: | Illustrate about the Fungi classification, Structure and reproduction. | Up to K4 | | | | | |
| CO4: | Differentiate the different types of Virus structure, classification and reproduction. | Up to K4 | | | | | |
| CO5: | Identify the structural organization of Algae and Protozoa. | Up to K3 | | | | | |

CO & PO Mapping:

| CO's | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
|------|-------------|-------------|-------------|------|------|-------------|
| CO 1 | 3 | 1 | 1 | 3 | 3 | 2 |
| CO 2 | 3 | 2 | 3 | 2 | 2 | 2 |
| CO 3 | 2 | 1 | 1 | 1 | 1 | 2 |
| CO 4 | 3 | 2 | 3 | 2 | 2 | 1 |
| CO 5 | 3 | 2 | 3 | 2 | 2 | 1 |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

| Unit | Course Name | Hrs | Pedagogy |
|------|---|-----|-------------------------------|
| I | Development of Microbiology and Microscopy - Definition and scope of Microbiology. History & development of Microbiology. General principal and Binominal nomenclature of Microorganism. Microscope- Principles, Working, Mechanism and Application - Simple and Compound microscope. | 18 | Chalk &Talk |
| П | Bacteriology - General characteristics of Bacteria-Classification, Ultra Structure- Gram positive and Gram negative cell wall, Reproduction, Biological and Economic importance of <i>Bacillus, Rhizobium, E.coli</i> and <i>Vibrio</i> . | 18 | PPT, Chalk &Talk |
| ш | Mycology - General characteristics of Fungi- Classification, Ultra structure, Reproduction, Biological and Economic importance of <i>Saccharomyces, Aspergillus, Agaricus, Penicillium</i> . | 18 | PPT, Chalk &Talk |
| IV | Virology - General characteristics of Viruses-Classification, Ultra Structure, Reproduction of Plant virus – (TMV, CMV); Animal virus-(Pox and Adeno); Bacterial virus (T4 and lambda) - Antiviral agent. | 18 | Chalk &Talk & PPT |
| V | Phycology and Parasitology - General characteristics of Algae – Classification, Ultra structure, Reproduction, Biological and Economic importance of <i>Chlorella</i> , <i>Spirulina</i> , <i>Chlamydomonas</i> , Protozoa – Classification, Ultra structure, Reproduction of <i>Entamoeba histolytica</i> , <i>Plasmodium</i> . | 18 | Chalk &Talk, Assignment |

LESSON PLAN

Course Designed by: 1. Ms. C. Thenmozhi, Assistant Professor. 2. Mrs. M.R.S. Saranya, Assistant Professor.

| | Learning Outcome Based Education & Assessment (LOBE) | | | | | | | | | | |
|-----------------|--|---|-----------------------------------|----------------------|--------------|----------------------|--------------|-----------|-----------|--|--|
| | Formative Examination - Blue Print | | | | | | | | | | |
| | | | Articulatio | on Mapping | – K Levels v | with Course | Outcom | es (COs) | | | |
| | | | | Section A MCQs | | Section | n B | Section C | Section D | | |
| Inter | C | 06 | K Level | | | Short Answers | | Either or | Open | | |
| nal | Ŭ | 05 | K Levei | No. of. Questions | K - Level | No. of. Questions | K - Level | Choice | Choice | | |
| СПАТ | | D1 | Up to K2 | 2 | K1& K2 | 1 | K2 | 2(K2&K2) | 1(K2) | | |
| | CIA I CO2 | | Up to K3 | 2 | K1 &K2 | 2 | K2 | 2(K3&K3) | 2(K3&K3) | | |
| CIA | CO | O3 Up to K4 | | 2 | K1&K2 | 1 | K2 | 2(K2&K2) | 1(K4) | | |
| II | CO4 | | Up to K4 | 2 | K1&K2 | 2 | K2 | 2(K3&K3) | 2(K4&K4) | | |
| | | No. of Questions to be asked No. of Questions to be answered | | 4 | | 3 | | 4 | 3 | | |
| Questi | on | | | 4 | | 3 | | 2 | 2 | | |
| Patter CIA I | rn | | Marks for each question 1 | | | 2 | | 5 | 10 | | |
| п | | | otal Marks for each section | 4 | | 6 | | 10 | 20 | | |

| | | Di | stribution of | Marks with | K Level CI | A I & Cl | AII | |
|-----------|------------|--|---|---|-------------------------------|----------------|--------------------------------------|---------------------|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % |
| | K1 | 2 | - | - | - | 2 | 3.33 | 50 |
| | K2 | 2 | 6 | 10 | 10 | 28 | 46.66 | 50 |
| CIA | K3 | - | - | 10 | 20 | 30 | 50 | 50 |
| | K4 | - | - | - | - | - | - | - |
| - | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 |
| | K1 | 2 | 2 | - | - | 4 | 6.66 | 33 |
| CIA | K2 | 2 | 4 | 10 | - | 16 | 26.66 | |
| CIA II | K3 | - | - | 10 | - | 10 | 16.66 | 17 |
| 11 | K4 | - | - | - | 30 | 30 | 50 | 50 |
| | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

| Sum | mative | Examination · | – Blue Print . | Articulation (COs) | | K Level | with Course | Outcomes |
|------------------------------|----------------|----------------------|---------------------|-----------------------|------------------------------|--------------|-------------------------|------------------|
| S.No Cos | | K - Level | Section (MC | | Section B (Short Answers) | | Section C | Section D |
| 5. 1NO | Cos | K - Level | No. of Questions | K – Level | No. of Question | K – Level | (Either / or Choice) | (Open Choice) |
| 1 | CO1 | Up to K2 | 2 | K1&K2 | 1 | K2 | 2(K2&K2) | 1(K2) |
| 2 | CO2 | Up to K3 | 2 | K1&K2 | 1 | K2 | 2(K3&K3) | 1(K3) |
| 3 | CO3 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2(K3&K3) | 1(K4) |
| 4 | CO4 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2(K4&K4) | 1(K4) |
| 5 | CO5 | Up to K3 | 2 | K1&K2 | 1 | K2 | 2(K2&K2) | 1(K3) |
| No. | of Ques Ask | stions to be ted | 10 | | 5 | | 10 | 5 |
| No. | of Ques | stions to be ered | 10 | | 5 | | 5 | 3 |
| Marks for each question | | ch question | 1 | | 2 | | 5 | 10 |
| Total Marks for each section | | 10 | | 10 | | 25 | 30 | |
| | (Figu | res in parenth | esis denotes, | questions s | hould be ask | ed with | the given K lev | vel) |

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| | | | Distribution o | of Marks wit | h K Leve | 1 | | | |
|------------|---|---|-------------------------------------|-------------------------------|----------------|--------------------------------------|-------------------|--|--|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % | | |
| K1 | 5 | - | - | - | 05 | 4.16 | 4 | | |
| K2 | 5 | 10 | 20 | 10 | 45 | 37.5 | 38 | | |
| K3 | - | - | 20 | 20 | 40 | 33.33 | 33 | | |
| K4 | - | - | 10 | 20 | 30 | 25 | 25 | | |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 | | |
| | NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels. | | | | | | | | |

Section A (Multiple Choice Questions) **Answer All Questions** (10x1=10 marks) Q.No CO **K** Level Questions CO1 K1 1 2 CO1 K2 3 CO₂ K1 CO2 K2 4 5 CO3 K1 CO3 6 K2 7 CO4 K1 CO4 K2 8 9 CO5 K1 10 CO5 K2 Section B (Short Answers) **Answer All Questions** (5x2=10 marks) Q.No K Level CO **Ouestions** CO1 K2 11 12 CO2 K2 13 CO3 K2 CO4 14 K2 CO5 15 K2 Section C (Either/Or Type) **Answer All Questions** (5 x 5 = 25 marks)Q.No CO K Level Questions 16) a CO1 K2 K2 16) b CO1 CO2 K3 17) a CO2 K3 17) b 18) a CO3 K3 CO3 K3 18) b CO4 K4 19) a CO4 19) b K4 CO5 **K**2 20) a 20) b CO5 **K**2 NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels Section D (Open Choice) **Answer Any Three questions** (3x10=30 marks) K Level Questions Q.No CO 21 CO1 K2 K3 22 CO2 23 CO3 K4 CO4 K4 24 K3 25 CO5

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| | BASIC CONCEPTS IN CHEMISTRY | | | |
|---|--|---|--|--|
| Course Code | 21UCHN31 | L | Р | С |
| Category | Non Major Elective | 2 | - | 2 |
| Nature of cours | se: EMPLOYABILITY SKILL ORIENTED 🗸 ENTREF | PRENURS | SHIP | |
| Course Object | ives: | | | |
| • To recall the | e atoms and molecules and basic properties of both metals and no | n-metals. | | |
| • To remember | er the basics of pure substance and mixtures, fuels and catalysts. | | | |
| To compare | the homogeneous and heterogeneous mixtures and types of catal | ysts. | | |
| • To perform | the properties of states of matter and separation process. | | | |
| • To determin | the the various concepts on atoms, molecules, fuels and catalysis. | | | |
| Unit: I MA | ATTER | | 06 | , |
| Atoms and Mo | elecules – atom – molecule – subatomic particles of atom – st | tructure of | fator | n – |
| | ns – valency – Bohr's model of an atom – states of matter – solid, | | | |
| evaporation | | 1 | U | |
| Unit: II PU | RE SUBSTANCE AND MIXTURES | | 06 |) |
| Pure Substance | - Mixtures - Homogeneous and Heterogeneous mixtures - solut | ion – true | solut | ion, |
| | spension. Separation process of mixtures – evaporation, centrifu | | | |
| | tion, simple distillation – difference between pure substance and r | - | 1 | U |
| | ETALS AND NON-METALS | | 06 | j |
| Metals – physic | cal properties of Metals – Hardness, lustrous, malleability, ducti | lity, condu | ictioi | ı of |
| | icity and sonorous. Non – Metals – exceptional cases of metals | | | |
| | | s and non- | meta | 15 - |
| ionic bond. | | s and non- | meta | 15 |
| | ELS | | 06 | |
| Unit: IV FU | | | 06 |) |
| Unit: IV FU | ELS tion – classification - Solid, liquid and gases, petroleum, refi | | 06 |) |
| Unit: IVFUFuels– Definitbetween petrola | ELS tion – classification - Solid, liquid and gases, petroleum, refi | | 06 | ence |
| Unit: IVFUFuels $-$ Definitbetween petrol aUnit: VCA | ELS tion – classification - Solid, liquid and gases, petroleum, refi and diesel. TALYSIS | ining – d | 06 iffere 06 | ence |
| Unit: IVFUFuels - Definitbetween p =trolUnit: VCACatalyst: | ELS tion – classification - Solid, liquid and gases, petroleum, refa | ining – d | 06 iffere 06 | ence |
| Unit: IVFUFuels - Definitbetween p =trolUnit: VCACatalyst: | ELS tion – classification - Solid, liquid and gases, petroleum, refr and diesel. TALYSIS ition, homogeneous and heterogeneous catalysis (definitions is, catalytic promoters, enzyme catalysts. | ining – d and exar | 06 iffere 06 | ence () – |
| Unit: IVFUFuels - Definitbetween p =trolUnit: VCACatalyst: | ELS tion – classification - Solid, liquid and gases, petroleum, refr and diesel. TALYSIS ition, homogeneous and heterogeneous catalysis (definitions is, catalytic promoters, enzyme catalysts. Total Lecture | ining – d and exar | 06 iffere 06 nples | ence () – |
| Unit: IVFUFuels $-$ Definitbetween petrol aUnit: VCACatalyst: definitcatalytic poisonBooks for Stud | ELS tion – classification - Solid, liquid and gases, petroleum, refr and diesel. TALYSIS ition, homogeneous and heterogeneous catalysis (definitions is, catalytic promoters, enzyme catalysts. Total Lecture ly: | ining – d and exar e Hours | 06 iffere 06 nples 30 H | ence) – |
| Unit: IVFUFuels \neg Definitbetween petrol aUnit: VCACatalyst:definitcatalytic poisonBooks for Stud1. Ramesh Kap | ELS tion – classification - Solid, liquid and gases, petroleum, refr and diesel. TALYSIS ition, homogeneous and heterogeneous catalysis (definitions is, catalytic promoters, enzyme catalysts. Total Lecture | ining – d and exar e Hours | 06 iffere 06 nples 30 H | ence) – |
| Unit: IVFUFuels \neg between \neg between \neg \neg Unit: VCACatalyst: \neg catalytic \neg \neg Books for Stud1. Ramesh KapDelhi, 2018. | ELS tion – classification - Solid, liquid and gases, petroleum, refr and diesel. TALYSIS ition, homogeneous and heterogeneous catalysis (definitions is, catalytic promoters, enzyme catalysts. Total Lecture ly: poor, R S Chopra, Sunita Bhagat, Fundamental Chemistry, R. C | ining – d and exar e Hours | 06 iffere 06 nples 30 H | nce) – |
| Unit: IVFUFuels \neg Definitbetween petrol aUnit: VCACatalyst: definitcatalytic poisonBooks for Stud1. Ramesh KapDelhi, 2018.Books for Reference | ELS tion – classification - Solid, liquid and gases, petroleum, refr and diesel. TALYSIS ition, homogeneous and heterogeneous catalysis (definitions is, catalytic promoters, enzyme catalysts. Total Lecture ly: poor, R S Chopra, Sunita Bhagat, Fundamental Chemistry, R. C erences: | ining – d and exar e Hours [Chand & C | 06 iffere 06 nples 30 H | ence) – Trs New |
| Unit: IVFUFuels \neg Definitbetween petrol aUnit: VCACatalyst:definitcatalytic poisonaBooks for Stud1. Ramesh KapDelhi, 2018.Books for Refer1. Anil Kumar | ELS tion – classification - Solid, liquid and gases, petroleum, refr and diesel. TALYSIS ition, homogeneous and heterogeneous catalysis (definitions is, catalytic promoters, enzyme catalysts. Total Lecture ly: poor, R S Chopra, Sunita Bhagat, Fundamental Chemistry, R. C erences: Tomar and Pallabi B. Tomar, Basics of Chemistry, Pegasus Enc | ining – d and exar e Hours [Chand & C | 06 iffere 06 nples 30 H | ence) – Trs New |
| Unit: IVFUFuels $-$ Definitbetween petrol aUnit: VCACatalyst: definitcatalytic poisonBooks for Stud1. Ramesh KapDelhi, 2018.Books for Refe1. Anil KumarNew Delhi, 201 | ELS tion – classification - Solid, liquid and gases, petroleum, refr and diesel. TALYSIS ition, homogeneous and heterogeneous catalysis (definitions as, catalytic promoters, enzyme catalysts. Total Lecture ly: boor, R S Chopra, Sunita Bhagat, Fundamental Chemistry, R. C erences: Tomar and Pallabi B. Tomar, Basics of Chemistry, Pegasus Enc 8 | ining – d and exar e Hours [Chand & C | 06 iffere 06 nples 30 H | ence) – Trs New |
| Unit: IVFUFuels \neg Definitbetween petrol aUnit: VCACatalyst: definitcatalytic poisonadditional catalytic poisonBooks for Stud1. Ramesh KapDelhi, 2018.Books for Refe1. Anil KumarNew Delhi, 201Web Resources | ELS tion – classification - Solid, liquid and gases, petroleum, refr and diesel. TALYSIS ition, homogeneous and heterogeneous catalysis (definitions is, catalytic promoters, enzyme catalysts. Total Lecture ly: boor, R S Chopra, Sunita Bhagat, Fundamental Chemistry, R. C erences: Tomar and Pallabi B. Tomar, Basics of Chemistry, Pegasus Enc 8 s: | ining – d and exar e Hours [Chand & C | 06 iffere 06 nples 30 H | ence) – Trs New |
| Unit: IVFUFuels \neg between petrol abetween petrol aCAUnit: VCACatalyst: definit catalytic poisonaaBooks for Stud1. Ramesh KapDelhi, 2018.Books for Refe1. Anil KumarNew Delhi, 201Web Resources1. shorturl.at/gl | ELS tion – classification - Solid, liquid and gases, petroleum, refr and diesel. TALYSIS ition, homogeneous and heterogeneous catalysis (definitions as, catalytic promoters, enzyme catalysts. Total Lecture ly: boor, R S Chopra, Sunita Bhagat, Fundamental Chemistry, R. C erences: Tomar and Pallabi B. Tomar, Basics of Chemistry, Pegasus Enc 8 s: KP6 | ining – d and exar e Hours Chand & C | 06 iffere 06 nples 30 H Co., N |) – rrs Jew ary, |
| Unit: IVFUFuels \neg Definitbetween petrol aUnit: VCACatalyst: definitcatalytic poisonadditional stressBooks for Stud1. Ramesh KapDelhi, 2018.Books for Refe1. Anil KumarNew Delhi, 201Web Resources1. shorturl.at/glCourse Outcom | ELS tion – classification - Solid, liquid and gases, petroleum, refr and diesel. TALYSIS ition, homogeneous and heterogeneous catalysis (definitions as, catalytic promoters, enzyme catalysts. Total Lecture ly: boor, R S Chopra, Sunita Bhagat, Fundamental Chemistry, R. C erences: Tomar and Pallabi B. Tomar, Basics of Chemistry, Pegasus Enc 8 s: KP6 nes | ining – d and exar e Hours Chand & C | 06 iffere 06 nples 30 H |) – rrs Jew ary, |
| Unit: IVFUFuels $-$ Definitbetween petrol aUnit: VCACatalyst: definitcatalytic poisonadditional catalytic poisonBooks for Stud1. Ramesh KapDelhi, 2018.Books for Refe1. Anil KumarNew Delhi, 201Web Resources1. shorturl.at/gICourse Outcom | ELS tion – classification - Solid, liquid and gases, petroleum, refr and diesel. TALYSIS ition, homogeneous and heterogeneous catalysis (definitions is, catalytic promoters, enzyme catalysts. Total Lecture ly: boor, R S Chopra, Sunita Bhagat, Fundamental Chemistry, R. C erences: Tomar and Pallabi B. Tomar, Basics of Chemistry, Pegasus Enc 8 s: KP6 mes etion of the course the student will be able to | ining – d and exar e Hours Chand & C cyclopedia | 06 iffere 06 nples 30 H Co., N Libr | ince ince ince ince ince ince ince ince |
| Unit: IVFUFuels $-$ Definitbetween petrol aUnit: VCACatalyst: definitcatalytic poisonadditional stressBooks for Stud1. Ramesh KapDelhi, 2018.Books for Refe1. Anil KumarNew Delhi, 201Web Resources1. shorturl.at/glCourse OutcomOn the completeCO1:Ability | ELS tion – classification - Solid, liquid and gases, petroleum, refr and diesel. TALYSIS ition, homogeneous and heterogeneous catalysis (definitions as, catalytic promoters, enzyme catalysts. Total Lecture ly: boor, R S Chopra, Sunita Bhagat, Fundamental Chemistry, R. C erences: Tomar and Pallabi B. Tomar, Basics of Chemistry, Pegasus Enc 8 s: KP6 nes | ining – d and exar e Hours Chand & C cyclopedia ysis. [U | 06 iffere 06 nples 30 H Co., N | ince ince irs New ary, rel K2] |

| CO3: | Interpret the knowledge of atoms, molecules, fuels and catalysts. | [Up to K3] |
|-------------|--|------------|
| CO4: | Examine the properties of metals and non-metals and role of catalysts. | [Up to K4] |
| CO5: | Distinguish between pure substance and mixtures, various types of catalysts. | [Up to K4] |

CO & PO Mapping:

| Course Outcomes | s Programme Outcomes (POs) | | | | | | |
|------------------------|----------------------------|-------------|------|------|------|-------------|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | |
| CO5 | 1 | 3 | 2 | 3 | 2 | 1 | |
| Weightage | 10 | 10 | 10 | 11 | 9 | 11 | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| Unit | Course Name | Hrs | Pedagogy |
|------|--|-----|---------------------------------|
| I | MATTER Atoms and Molecules – atom – molecule – subatomic particles of atom – structure of atom – valence electrons – valency – Bohr's model of an atom – states of matter – solid, liquid and gases – evaporation | 06 | Chalk, Talk & Power point |
| II | PURE SUBSTANCE AND MIXTURES Pure Substance – Mixtures – Homogeneous and Heterogeneous mixtures – solution – true solution, colloidal and suspension. Separation process of mixtures – evaporation, centrifugation, separating funnel, sublimation, simple distillation – difference between pure substance and mixtures. | 06 | Chalk, Talk & Power point |
| ш | METALS AND NON-METALS Metals – physical properties of Metals – Hardness, lustrous, malleability, ductility, conduction of heat and electricity and sonorous. Non – Metals – exceptional cases of metals and non-metals – ionic bond. | 06 | Chalk, Talk & Power point |
| IV | FUELS Fuels – Definition – classification - Solid, liquid and gases, petroleum, refining – difference between petrol and diesel | 06 | Chalk, Talk & Power point |
| V | CATALYSIS Catalyst: definition, homogeneous and heterogeneous catalysis (definitions and examples) – catalytic poisons, catalytic promoters, enzyme catalysts | 06 | Chalk, Talk & Power point |

Course Designed by: Dr. A. J. Sunija & Dr. R. Satheesh





MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | ORGANIC CHEMISTRY – II | | | | | | |
|--|--|-------|--------|--------------|--|--|--|
| Course Code | 21UCHC41 | L | Р | С | | | |
| Category | Core | 4 | - | 4 | | | |
| Nature of courses | : EMPLOYABILITY 🗸 SKILL ORIENTED ENTREPREN | URS | HIP | \checkmark | | | |
| Course Objectiv | es: | | | | | | |
| • To recall the | general characteristics of aromatic compounds and reaction mechanic | sms. | | | | | |
| | the basics of aromatic compounds and polynuclear compounds. | | | | | | |
| - | he preparation, properties of ortho, para, meta directing and aromatic | com | poun | ds. | | | |
| - | ne mechanism of reactions and effects of substituents. | | | | | | |
| | the various concepts on mechanisms and polynuclear compounds. MATIC COMPOUNDS – I | | 12 | | | | |
| | eneral characteristics of aromatic compounds – Aromaticity and H | uckel | | | | | |
| | zene – Mechanism of aromatic electrophilic substitution (Halogenat | | | | | | |
| | Friedel – Crafts reactions. Directive influence of substituents based | | | | | | |
| effects (ortho/par | ra/meta directing) -Di-substituted benzenes - Steric hindrance - I | Mecha | anism | ı of | | | |
| | hilic substitution, unimolecular, bimolecular and benzyne mechanism | ns. | | | | | |
| | DMATIC COMPOUNDS – II | | 12 | | | | |
| • | des: Mechanism of Cannizzaro, Perkins, Claisen, Knoevenagel | | | | | | |
| | sation – Preparation and properties of cinnamaldehyde and vani | | | | | | |
| | ctetophenone – preparation – Houben – Hosch synthesis. Pheno | | ciaity | 01 | | | |
| ARO | of substituents on the acidity of phenol – mechanism of Kolbe's react DMATIC HYDROCARBONS, HALOGEN, NITRO AND AMIN | | | | | | |
| | APOUNDS | U | 12 | | | | |
| | carbons: Preparation, properties and uses of toluene xylene and | | | | | | |
| | n compounds: preparation, Properties and uses of bromobenzen | | | | | | |
| | vity of aryl halides, distinction between nuclear and side chair | | 0 | | | | |
| | matic nitro compounds: preparation and properties of nitrotoluer ls: Preparation by reduction of nitro compounds and from chlorober | | | | | | |
| - | n the basic character of aromatic amines – Comparison between | | | | | | |
| | – Preparation of aniline, sulphanilic acid, nitroanilines and phenyle | - | | | | | |
| | ynthetic applications of benzene diazonium chloride. | | | | | | |
| | OMATIC ACIDS | | 12 | | | | |
| | tuents on acidic character. Monocarboxylic acids: preparation, | | | | | | |
| salicylic acid and anthranilic acid. Dicarboxylic acids: preparation, properties of phthalic acid, | | | | | | | |
| phenylacetic acid, mandelic acid, cinnamic acid & coumarin. Aromatic Sulphonic acids: preparation, properties and uses of benzene sulphonic acid and saccharin. | | | | | | | |
| | Y NUCLEAR HYDROCARBONS AND THEIR DERIVATIVE | c | 12 | | | | |
| Isolated system | | | | cid, | | | |
| Isolated systems: Preparation and properties of diphenyl, benzidine diphenic acid, diphenylmethane, triphenylmethane and stilbene. Condensed systems: Preparation properties, uses | | | | | | | |
| | of Naphthalene, Naphthylamines, Naphthols, Naphthaquinones | - | | | | | |
| | lizarin and phenanthrene. | | | | | | |
| | | | | | | | |

| | Total Lecture Ho | urs 60 Hrs |
|-------------|--|-----------------|
| Books | for Study: | |
| 1. Soni | . P.L and Chawla. H.M, Textbook of Organic Chemistry, S. Chand & Sor | ns, 2007, New |
| Delhi. | | , , |
| Books | for References: | |
| 1. Jain | . M.K, and Sharma. S.C, Modern Organic Chemistry, 4 th Edition, Vishal P | ublishing Co., |
| 2016, J | alandhar. | - |
| 2. Aru | n Bahl and Bahl. B.S, A Textbook of Organic Chemistry, S. Chand & Co | o., 2012, New |
| Delhi. | | |
| | y March, Advanced Organic Chemistry, 4th Edition, John Wiley and Sons, 199 | |
| 4. S.H | . Pine, Organic Chemistry, 5th Edition, McGraw Hill International Edition, Che | emistry Series, |
| | Jew York. | |
| 5. Moi | rison. R.T and Boyd. R.N, Organic Chemistry, 6th Edition, Printice-Hall of In- | dia Ltd., 1992, |
| New D | elhi. | |
| Web R | esources: | |
| | ://youtu.be/IVbuBY0YMu4 | |
| | ://youtu.be/Ywgkw4vK01s | |
| | ://youtu.be/Ixe0swwcca0 | |
| | ://youtu.be/A11zmE_r7NY | |
| | ://youtu.be/vKmTUIKoJVM | K Level |
| | e Outcomes | K Level |
| Un th | e completion of the course the student will be able to | |
| CO1: | Recall the general characteristics of aromatic compounds and discuss the | [Up to K2] |
| | reaction | |
| CO2: | Prepare the aromatic compounds like aromatic hydrocarbons, halogen, | [Up to K3] |
| | amino, substituted Examine the effect of substituents on acidic/basic character of aromatic | |
| CO3: | | [Up to K3] |
| | compounds. | |
| CO4: | Interpret the directive influence of substituent on electronic effects and properties of aromatic compounds. | [Up to K4] |
| | | |
| CO5: | Integrate the reaction mechanism of aromatic compounds and formulate in the surthetic applications | [Up to K4] |
| | the synthetic applications. | |

CO & PO Mapping:

| Course Outcomes | | Programme Outcomes (POs) | | | | | | |
|-----------------|------|--------------------------|------|------|-------------|-------------|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | |
| CO5 | 1 | 3 | 2 | 3 | 2 | 1 | | |
| Weightage | 10 | 10 | 10 | 11 | 9 | 11 | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| Unit | Course Name | Hrs | Pedagogy |
|------|--|-----|------------------------------------|
| I | AROMATIC COMPOUNDS – I Introduction – General characteristics of aromatic compounds – Aromaticity and Huckel's rule – Structure of benzene – Mechanism of aromatic electrophilic substitution (Halogenation, nitration, sulphonation and Friedel – Crafts reactions. Directive influence of substituents based on electronic effects (ortho/para/meta directing) –Di-substituted benzenes – Steric hindrance – Mechanism of aromatic nucleophilic substitution, unimolecular, bimolecular and benzyne mechanisms. | 12 | Chalk, Talk & Power point |
| II | AROMATIC COMPOUNDS – II Aromatic aldehydes: Mechanism of Cannizzaro, Perkins, Claisen, Knoevenagel reaction and Benzoin condensation – Preparation and properties of cinnamaldehyde and vanillin. Phenolic ketones: Phloroactetophenone – preparation – Houben – Hosch synthesis. Phenols: Acidity of phenols – effect of substituents on the acidity of phenol – mechanism of Kolbe's reaction. | 12 | Chalk, Talk & Power point |
| III | AROMATIC HYDROCARBONS, HALOGEN, NITRO AND AMINO COMPOUNDS Aromatic Hydrocarbons: Preparation, properties and uses of toluene xylene and mesitylene –Aromatic halogen compounds: preparation, Properties and uses of bromobenzene and benzyl bromide- Reactivity of aryl halides, distinction between nuclear and side chain halogenated derivatives. Aromatic nitro compounds: preparation and properties of nitrotoluenes. Aromatic amino compounds: Preparation by reduction of nitro compounds and from chlorobenzene – Effect of substituents on the basic character of aromatic amines – Comparison between aliphatic and aromatic amines – Preparation of aniline, sulphanilic acid, nitroanilines and phenylenediamines – Preparation and synthetic applications of benzene diazonium chloride. | 12 | Chalk, Talk & Power point |
| IV | AROMATIC ACIDS Effect of substituents on acidic character. Substituted acids: preparation, properties of salicylic acid and anthranilic acid. Mono & Dicarboxylic acids: preparation, properties of phthalic acid, phenylacetic acid, mandelic acid, cinnamic acid & coumarin. Aromatic Sulphonic acids: preparation, properties and uses of benzene sulphonic acid and saccharin. | 12 | Chalk, Talk & Power point |
| V | POLYNUCLEARHYDROCARBONSANDTHEIRDERIVATIVESIsolated systems:Preparation and properties of diphenyl, benzidinediphenic acid, diphenylmethane, triphenylmethane and stilbene.Condensed systems:Preparation properties, uses and structure ofNaphthalene,Naphthylamines,Naphthols,Naphthalene, anthraquinone, alizarin and phenanthrene. | 12 | Chalk, Talk & Power point |

Course Designed by: Dr. K. Muthupandi & Dr. V. Ramasamy Raja

| | Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs) | | | | | | | | | |
|--------------|--|---------------------------------------|----------------------|--------------|----------------------|--------------|-----------|------------|--|--|
| . . | | | Sectio | | Section | | Section C | Section D | | |
| Inte rnal | Cos | K Level | MC | - | Short An | | Either or | Open | | |
| 11141 | | | No. of. Questions | K – Level | No. of. Questions | K - Level | Choice | Choice | | |
| CI | CO1 | Up to K2 | 2 | K1&K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | |
| AI | CO2 | Up to K3 | 2 | K1&K2 | 2 | K2 | 2 (K3&K3) | 2(K2 & K3) | | |
| CI | CO3 | Up to K2 | 2 | K1&K2 | 1 | K2 | 2 (K2&K2) | 1(K2) | | |
| AII | CO4 | Up to K4 | 2 | K1&K2 | 2 | K2 | 2 (K3&K3) | 2(K3 &K4) | | |
| | | No. of Questions to be asked | 4 | | 3 | | 4 | 3 | | |
| ~ | stion tern | No. of Questions to be answered | 4 | | 3 | | 2 | 2 | | |
| CIA | I & II | Marks for each question | 1 | | 2 | | 5 | 10 | | |
| | | Total Marks for each section | 4 | | 6 | | 10 | 20 | | |

| | Distribution of Marks with K Level CIA I & CIA II | | | | | | | | | |
|-----|---|--|---|---|-------------------------------|----------------|--------------------------------------|---------------------|--|--|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % | | |
| | K1 | 2 | 2 | - | - | 4 | 6.67 | | | |
| | K2 | 2 | 4 | 10 | 20 | 36 | 60 | 67 | | |
| CIA | K3 | - | - | 10 | 10 | 20 | 33.33 | 33 | | |
| | K4 | - | - | - | - | - | - | - | | |
| - | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 | | |
| | K1 | 2 | 2 | - | - | 4 | 6.67 | | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 43.33 | 50 | | |
| CIA | K3 | - | - | 10 | 10 | 20 | 33.33 | 33 | | |
| II | K4 | - | - | - | 10 | 10 | 16.67 | 17 | | |
| | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 | | |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| S | Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs) | | | | | | | | |
|--------------------------------|---|---------------|-------------------------|--------------|--------------------|--------------|----------------------------|-------------------------------|--|
| | | | MCQs | | Short Answers | | Section C | Section D | |
| S. No | Cos | K - Level | No. of Question s | K – Level | No. of Question | K – Level | (Either / or Choice) | Section D (Open Choice) | |
| 1 | CO1 | Up to K 2 | 2 | K1, K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | |
| 2 | CO2 | Upto K 3 | 2 | K1&K2 | 1 | K1 | 2 (K3&K3) | 1(K3) | |
| 3 | CO3 | Up to K 3 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K3) | |
| 4 | CO4 | Up to K 4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | |
| 5 | CO5 | Up to K 4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | |
| No. of | Questions | s to be Asked | 10 | | 5 | | 10 | 5 | |
| No.of Questions to be answered | | 10 | | 5 | | 5 | 3 | | |
| Marks for each question | | 1 | | 2 | | 5 | 10 | | |
| Total Marks for each section | | | 10 | | 10 | | 25 | 30 | |
| | (Figures | in parenthesi | is denotes, q | uestions s | hould be asl | ked with | the given K | level) | |

Distribution of Marks with K Level Section B Section A % of Section C **Section D** Consolidated K (Multiple (Short Total (Marks (Either/ or (Open Choice Marks without % Level Answer Choice) Choice) **Questions**) **Questions**) choice) K1 4 9 7.5 5 -33 K2 31 5 6 10 10 25.83 K3 50 40 20 50 60 --K4 -20 20 16.67 17 _ _ Marks 10 10 50 50 120 100 100

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

| Section . | A (Mul | tiple Choic | ce Questions) |
|------------|---------|-------------|---|
| Answer | All Qu | estions | (10x1=10 marks) |
| Q. No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| Section 1 | B (Shoi | t Answers |) |
| Answer | | | (5x2=10 marks) |
| Q. No | CO | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| Section | C (Eith | er/Or Typ | e) |
| Answer | All Qu | estions | $(5 \times 5 = 25 \text{ marks})$ |
| Q. No | CO | K Level | Questions |
| 16) a | CO1 | K2 | |
| 16) b | CO1 | K2 | |
| 17) a | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K3 | |
| 19) b | CO4 | K3 | |
| 20) a | CO5 | K3 | |
| 20) b | CO5 | K3 | |
| NB: Hig | her lev | el of perfo | rmance of the students is to be assessed by attempting higher |
| level of l | | - | • • • • • • |
| Section 1 | D (Ope | n Choice) | |
| | - | nree questi | ons (3x10=30 marks) |
| Q. No | CO | K Level | Questions |
| 21 | CO1 | K2 | |
| 22 | CO2 | K3 | |
| 23 | CO3 | K3 | |
| 25 | | 17.4 | |
| 23 | CO4 | K4 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | PHYSICAL CHEMISTRY – II | | | |
|--|---|---------|--------------------|----------------|
| Course Code | 21UCHC42 | L | Р | С |
| Category | Core | 4 | - | 4 |
| Nature of course | :: EMPLOYABILITY 🖌 SKILL ORIENTED 🖌 ENTREPRE | NUR | SHIP | \checkmark |
| Course Objectiv | ves: | | | |
| • To recall | the basic thermodynamic laws and gibbs phase rule. | | | |
| • To remen | nber the symmetry operations, absorption, emission and vibrational s | spectr | a. | |
| To Comp | are the relationship between Kp and Kc, two component system and | grou | p table | s. |
| • To execu | te the group multiplication tables and phase rules. | | | |
| • To Deter | mine the Le-chatelier principle, distillation, Condon principle and po | oint gi | oups. | |
| | EMICAL EQUILIBRIUM | | 12 | |
| The law of mass | s action- Thermodynamic treatment of law of mass action, Relatio | nship | betwe | een |
| Kp and Kc. App | lication of Law of mass action to Homogeneous system- Dissociati | on of | PCl ₅ a | ind |
| N ₂ O ₄ . Application | on of Law of mass action to Heterogeneous system -Calcium | carbo | nate. I | Le- |
| Chatelier Princip | le-Formation of Ammonia – Haber's process. | | | |
| | ASE RULE | | 12 | |
| Gibbs phase rule | e - Definition of terms involved - Derivation of Gibb's phase rule - | - appli | ication | of |
| phase rule to one | e component system -water system. Two component system-simple | eutect | ic-Pb- | Ag |
| system. Compou | nd formation-Congruent melting point-Zn-Mg system, Incongruent | melti | ng poi | nt- |
| Na ₂ SO ₄ -H ₂ O sy | stem. Liquid system - partially miscible liquid system-phenol- | water | syste | em. |
| - · | bile system-Alcohol-water system Completely immiscible system-b | enzei | ne –wa | ter |
| | of fractional distillation - steam distillation. | | | |
| | OUP THEORY | | 12 | |
| | netry elements and symmetry operations - operations - production | | | |
| | perties of a group - classes and sub groups - groups multiplication | | | 2_{2v} . |
| | classification of molecules into point groups $-C_{2v}$, C_{3v} , C_{2h} , D_{2h} , D_{6h} , | and T | | |
| | CTROSCOPY – I | | 12 | |
| | bsorption and Emission spectra (Elementary ideas)-Electromagnetic | | | |
| | es in each region. Molecular spectra – Types of molecular spec | | | |
| 1 | nic molecules – Rigid rotator – selection rule-determination of mo | | | |
| - | h. UV Visible spectroscopy - Types of electronic transitions | | | |
| probability-Chro | 1 1 | tensity | / | ifts |
| | hypsochromic, hyperchromic and hypochromic shifts). Theory | 01 6 | electro | nic |
| <u> </u> | ranck and Condon principle - Applications of UV – Visible spectra. | | 10 | |
| | CTROSCOPY – II | | 12 | a t a # |
| - | tra – IR spectra of diatomic molecules – Hooke's law – simple hard | | | |
| | Force constant – selection rule – Vibrational energy level diagram etermination and calculation of zero-point energy. Modes of vibratio | | - | |
| | $_2$ and H ₂ O molecules. Raman spectra — Quantum theory of Raman | | | |
| | $\frac{1}{2}$ and $\frac{1}{2}$ of molecules. Kannah spectra — Quantum theory of Kannah spectra M spectra — Quantum theory of Kannah spectra M spectra — Quantum theory of Kannah spectra M | | | |
| | Raman spectra – Rotational-vibrational Raman spectra of a diatomic | | - | u |
| | Total Lecture 1 | | 1 | Hrc |
| | | iour | | |

Books for Study:

1. B.S. Puri, L.R. Sharma and S. Pathania, Principles of Physical Chemistry, 47th Edition, Shoban Lal Nagin Chand & Co., New Delhi, 2012.

2. A.S. Negi, S. C. Anand, A Text Book of Physical Chemistry. 2nd Edition, New Delhi: New Age International Publishers, 1998.

3. Y. R. Sharma, Elementary Organic spectroscopy - Principles and Chemical Applications, 3rd Edition, New Delhi, 2011.

Books for Reference:

8. W. Gilbert, Castellan, Physical Chemistry, 4th Edition, Narosa Publishing House, New Delhi, 2004.

9. P.W. Atkins, Physical Chemistry, 7th Edition, Oxford University, Press, 2001.

10. S.K. Dogra, S. Dogra, Physical Chemistry through Problems, 4th Edition, New Age International Publishers, 1996.

Web Resources:

1. https://youtu.be/Ye1ZD3wEJXM

- 2. https://youtu.be/lrosz8N-9tA
- 3. https://youtu.be/Ioi6YiPGV4A
- 4. https://youtu.be/x56OIrdFJrw
- 5. https://youtu.be/i07KnMEGjS8
- 6. https://youtu.be/WukUvN721Ag
- 7. https://youtu.be/RRME2G7k4Tw

| Course | Course Outcomes: | | | | | | |
|-------------|--|------------|--|--|--|--|--|
| On th | On the completion of the course the student will be able to | | | | | | |
| CO1: | Outline the basic principles and applications of chemistry in detail. | [Up to K2] | | | | | |
| CO2: | Apply the concept of duality, spectroscopic techniques, symmetry aspects, theory of dilute solutions and phase equilibrium for chemical systems. | [Up to K3] | | | | | |
| CO3: | Analyze the concept of quantum theory, the physical properties of various equilibria and spectroscopic parameters. | [Up to K3] | | | | | |
| CO4: | Evaluate the practical utility of complicated problem-solving skill aspects. | [Up to K4] | | | | | |
| CO5: | Develop a strategy to acquire advanced knowledge in various analytical techniques. | [Up to K4] | | | | | |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | | |
|------------------------|--------------------------|------|-------------|------|-------------|-------------|--|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | | |
| CO5 | 2 | 3 | 1 | 3 | 2 | 1 | | | |
| Weightage | 11 | 10 | 9 | 11 | 9 | 11 | | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| UNIT | PHYSICAL CHEMISTRY – II | Hrs | Mode |
|------|---|-----|------------------------------------|
| Ι | CHEMICAL EQUILIBRIUM The law of mass action- Thermodynamic treatment of law of mass action, Relationship between Kp and Kc. Application of Law of mass action to Homogeneous system- Dissociation of PCl ₅ and N ₂ O ₄ . Application of Law of mass action to Heterogeneous system -Calcium carbonate. Le-Chatelier Principle-Formation of Ammonia – Haber's process. | 12 | Chalk & Talk, Power Point |
| II | PHASE RULE Gibbs phase rule – Definition of terms involved – Derivation of Gibb's phase rule – application of phase rule to one component system -water system. Two component system-simple eutectic – Pb -Ag system. Compound formation-Congruent melting point-Zn-Mg system, Incongruent melting point-Na ₂ SO ₄ -H ₂ O system. Liquid system – partially miscible liquid system-phenol-water system. Completely miscible system-Alcohol-water system Completely immiscible system-benzene –water system – Theory of fractional distillation - steam distillation. | 12 | Chalk & Talk, Power Point |
| III | GROUP THEORY Molecular symmetry elements and symmetry operations – operations – production of symmetry operations – properties of a group – classes and sub groups – groups multiplication table – C_{2v} . Point groups – Classification of molecules into point groups – C_{2v} , C_{3v} , C_{2h} , D_{2h} , D_{6h} , and T_d . | 12 | Chalk & Talk, Power Point |
| IV | SPECTROSCOPY – I Introduction – Absorption and Emission spectra (Elementary ideas)- Electromagnetic radiation with relative intensities in each region. Molecular spectra – Types of molecular spectra. Rotational spectra of diatomic molecules – Rigid rotator – selection rule-determination of moment of inertia and bond length. UV Visible spectroscopy - Types of electronic transitions – Transition Probability - Chromophore and Auxochrome concepts – Absorption and Intensity shifts (Bathochromic, hypsochromic, hyperchromic and hypochromic shifts). Theory of electronic spectroscopyFranck and Condon principle - Applications of UV – Visible spectra. | 12 | Chalk & Talk, Power Point |
| V | SPECTROSCOPY – II Vibrational spectra – IR spectra of diatomic molecules – Hooke's law – simple harmonic oscillator (no derivation) force constant – selection rule – Vibrational energy level diagram – Applications- force constant determination and calculation of zero-point energy. Modes of vibration in polyatomic molecules – CO ₂ and H ₂ O molecules. Raman spectra — Quantum theory of Raman effect– Stokes and Anti - Stokes lines – experimental study – Comparison between IR and Raman spectra – Applications of Raman spectra – Rotational-vibrational Raman spectra of a diatomic molecule. | 12 | Chalk & Talk, Power Point |

Course Designed by: Dr. R. Satheesh & Dr. K. Muthupandi

| | Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs) | | | | | | | | | |
|------------|--|---------------------------------------|----------------------|--------------|----------------------|--------------|-----------|------------|--|--|
| | | | Sectio | on A | Sectior | n B | Section C | Section D | | |
| Inte | Cos | K Level | MC | Qs | Short Ans | swers | Either or | Open D | | |
| rnal | 005 | | No. of. Questions | K – Level | No. of. Questions | K - Level | Choice | Choice | | |
| CI | CO1 | Up to K2 | 2 | K1&K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | |
| AI | CO2 | Up to K3 | 2 | K1&K2 | 2 | K2 | 2 (K3&K3) | 2(K2 & K3) | | |
| CI | CO3 | Up to K2 | 2 | K1&K2 | 1 | K2 | 2 (K2&K2) | 1(K2) | | |
| AII | CO4 | Up to K4 | 2 | K1&K2 | 2 | K2 | 2 (K3&K3) | 2(K3 &K4) | | |
| | | No. of Questions to be asked | 4 | | 3 | | 4 | 3 | | |
| - | stion tern | No. of Questions to be answered | 4 | | 3 | | 2 | 2 | | |
| CIA I & II | | Marks for each question | 1 | | 2 | | 5 | 10 | | |
| | | Total Marks for each section | 4 | | 6 | | 10 | 20 | | |

| | Distribution of Marks with K Level CIA I & CIA II | | | | | | | | | | |
|-----|---|--|---|---|-------------------------------|----------------|--------------------------------------|---------------------|--|--|--|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % | | | |
| | K1 | 2 | 2 | - | - | 4 | 6.67 | 67 | | | |
| | K2 | 2 | 4 | 10 | 20 | 36 | 60 | 07 | | | |
| CIA | K3 | - | - | 10 | 10 | 20 | 33.33 | 33 | | | |
| I | K4 | - | - | - | - | - | - | - | | | |
| - | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 | | | |
| | K1 | 2 | 2 | - | - | 4 | 6.67 | 50 | | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 43.33 | 50 | | | |
| CIA | K3 | - | - | 10 | 10 | 20 | 33.33 | 33 | | | |
| II | K4 | - | - | - | 10 | 10 | 16.67 | 17 | | | |
| | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 | | | |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| S | Summativ | ve Examina | tion – Blue P | | - | ping – K | Level with (| Course |
|-----------------------------------|-------------------------|--------------|---------------------|----------------|--------------------|--------------|----------------------------|------------------|
| | | | MC | Outcomes Qs | (COs) Short An | swers | Section C | Section D |
| S. No | COs | K - Level | No. of Questions | K – Level | No. of Question | K – Level | (Either / or Choice) | (Open Choice) |
| 1 | CO1 | Up to K2 | 2 | K1,K2 | 1 | K1 | 2 (K2&K2) | 1(K2) |
| 2 | CO2 | Up to K3 | 2 | K1&K2 | 1 | K1 | 2 (K3&K3) | 1(K3) |
| 3 | CO3 | Up to K3 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K3) |
| 4 | CO4 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) |
| 5 | CO5 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) |
| No. | of Questie Askee | | 10 | | 5 | | 10 | 5 |
| No.of Questions to be answered | | 10 | | 5 | | 5 | 3 | |
| Marl | Marks for each question | | 1 | | 2 | | 5 | 10 |
| Total N | Aarks for e | each section | 10 | | 10 | | 25 | 30 |
| | (Figures | in parenthe | esis denotes, o | questions s | hould be as | ked with | the given K | level) |

| | | Dis | stribution of | Marks with | n K Leve | 1 | | |
|------------|---|---|-------------------------------------|--------------------------------|----------------|--------------------------------------|-------------------|--|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % | |
| K1 | 5 | 4 | - | - | 9 | 7.5 | 33 | |
| K2 | 5 | 6 | 10 | 10 | 31 | 25.83 | | |
| K3 | - | - | 40 | 20 | 60 | 50 | 50 | |
| K4 | - | - | - | 20 | 20 | 16.67 | 17 | |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 | |
| | NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels. | | | | | | | |

| Answer A | - | iple Choice stions | (10x1=10 marks) |
|----------------|------------|-----------------------|--|
| Q. No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| Section E | (Short | Answers) | |
| Answer A | | , | (5x2=10 marks) |
| Q. No | CO | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| Section (| C (Eithe | r/Or Type |) |
| Answer A | All Que | stions | (5 x 5 = 25 marks) |
| Q. No | CO | K Level | Questions |
| 16) a | CO1 | K2 | |
| 16) b | CO1 | K2 | |
| 17) a | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K3 | |
| 19) b | CO4 | K3 | |
| 20) a | CO5 | K3 | |
| 20) b | CO5 | K3 | |
| | | l of perfor | mance of the students is to be assessed by attempting higher |
| level of K | | ~ | |
| Section I | - | | |
| | 1 | ree questio | |
| Q. No | CO | K Level | Questions |
| 21 | CO1 | K2 | |
| 22 | CO2 | K3 | |
| 23 | CO3 | K3 | |
| | 001 | 17.4 | |
| 23 24 25 | CO4 CO5 | K4 K4 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | Major | Chemistry Practical | – II | (Volumetric Analysis) | | | | | | |
|--|--|--|-------|------------------------|-------|------|-----|-----|--|--|
| Course Code | 21UCI | HCP2 | | | | L | Р | С | | |
| Category | Core I | Practical | | | | - | 2 | 2 | | |
| Nature of cours | se: | EMPLOYABILITY | ~ | SKILL ORIENTED | ENTRE | PREN | URS | HIP | | |
| Course Objectives: | | | | | | | | | | |
| To recollect the theory of laboratory safety measures and strength of solutions. To remember the estimation of acidimetry and alkalimetry and redox titrations. To compare the concept of titration based on redox and hardness of water. To execute the concept of permanganometry and dichrometry. To determine the estimation of volumetric analysis. | | | | | | | | | | |
| | | Volumetric Analysis a | | - | ~ | | | Hrs | | |
| So | olutions - | Volumetric Analysis and List of Experiments Volumetric Analysis and Laboratory Safety Measures: Strength of 6 - Normality, Molarity, Molality. Handling of apparatus, glasswares als – Safety aspects | | | | | | | | |
| II Li | st of Exp | periments | | | | | | 24 | | |
| I. Acidimetry a | und Alkal | limetry | | | | | | | | |
| 1. Estimation of | of Na ₂ CO | 3 | | | | | | | | |
| 2. Estimation of | of NaOH | / KOH | | | | | | | | |
| 3. Estimation of | of oxalic a | acid. | | | | | | | | |
| II. Redox Titra | tions | | | | | | | | | |
| a. Permangano | metry | | | | | | | | | |
| 1. Estimati | on of ferr | rous ion | | | | | | | | |
| 2. Estimati | on of oxa | alic acid | | | | | | | | |
| 3. Estimati | on of cale | cium (direct method) | | | | | | | | |
| b. Dichrometry | 1 | | | | | | | | | |
| 1. Estimati | on of ferr | rous ion | | | | | | | | |
| 2. Estimati | on of ferr | ric ion using external ir | ndica | tor | | | | | | |
| V. EDTA Titra | tion | | | | | | | | | |
| 1. Estimat | 1. Estimation of Hardness of water using EDTA. | | | | | | | | | |
| | | | | | | | | | | |

Distribution of marks

Max marks: 100 Internal : 40 marks

External : 60 marks

| Laboratory Performance | : | 30 marks | Vivo voce | : | 5 marks |
|------------------------|----|----------|-----------------------|---|----------|
| Observation note book | : | 10 marks | Record note book | : | 10 marks |
| | | | Procedure writing | : | 15 marks |
| | | | Volumetric estimation | : | 30 marks |
| Total | •• | 40 marks | Total | : | 60 marks |

For Volumetric Estimation if the student have

| Less than 2% Error | - | 30 marks |
|--------------------|---|----------|
| 2-3% Error | - | 25 marks |
| 3-4% Error | - | 20 marks |
| 3-5% Error | - | 15 marks |
| Greater than 5% | - | 10 marks |

TOTAL HOURS 30 Hrs

Books for Study:

1. Vogel, Text book of Inorganic quantitative analysis, Longman Sc & Tech, 2008.

Books for References:

1. Jeyavathana Samuel, Chemistry Practical Book, G.G.Printers, Chennai, 2012.

2. Vickie. M.Williamson, M.Larry Peck, Lab manual for General Chemistry, Cengage Learning India

Private Limited, New Delhi, 2009.

3. Dr. V. V. Ramanujam, Inorganic Semimicro Qualitative Analysis, National Publishing Company,

Chennai, 3rd edition, 1974.

Web Resources:

1. https://youtu.be/xQDQNghs5dc

- 2. https://youtu.be/AdbK86BnXN8
- 3. https://youtu.be/dmnElKapQ00

| Course | Course Outcomes: | | | | | |
|---|---|------------|--|--|--|--|
| On the completion of the course the student will be able to | | | | | | |
| CO1: | Discuss the theory of safety measures in chemistry laboratory. | [Up to K2] | | | | |
| CO2: | D2: Understand the qualitative and quantitative analysis in practical chemistry. | | | | | |
| CO3: | Apply the theory on quantitative titration methods. | [Up to K3] | | | | |
| CO4: | Analyze the titrated values in tabular format. | [Up to K4] | | | | |
| CO5: | Construct the estimated value of the given compounds. | [Up to K4] | | | | |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | | |
|-----------------|--------------------------|------|------|------|------|------|--|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | | |
| CO 1 | 2 | 1 | 2 | 3 | 3 | 2 | | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | | |
| CO5 | 2 | 3 | 1 | 3 | 2 | 1 | | | |
| Weightage | 10 | 10 | 9 | 11 | 10 | 11 | | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| UNIT | Theory of Volumetric Analysis and Laboratory Safety Measures | Hrs | Mode |
|------|---|-----|-----------|
| Ι | Theory of Volumetric Analysis and Laboratory Safety Measures: Strength of Solutions – Normality, Molarity, Molality. Handling of apparatus, glasswares and chemicals – Safety aspects | 6 | |
| | List of Experiments | | |
| П | I. Acidimetry and Alkalimetry 1. Estimation of Na₂CO₃ 2. Estimation of NaOH / KOH 3. Estimation of oxalic acid. II. Redox Titrations a. Permanganometry 1. Estimation of ferrous ion 2. Estimation of oxalic acid 3. Estimation of calcium (direct method) b. Dichrometry 1. Estimation of ferrous ion 2. Estimation of ferrous ion 3. Estimation of ferrous ion 4. Estimation of ferric ion using external indicator V. EDTA Titration 1. Estimation of Hardness of water using EDTA. | 24 | Practical |

Course Designed by: Dr. Ramasamy Raja & Dr. K. Muthupandi



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Na | me Al | lied Mathematics – II (| (B.Sc., Chemistry) | | | | | |
|--|--|---|--|-----------------|-------|-------------|-------|--|
| Course Co | de 21 | 21UMCA43 | | | | | | |
| Category | Al | lied | | | 6 | - | 4 | |
| Nature of | Course: | EMPLOYBILITY | SKILL ORIENTED | ENTREPR | ENU | RSHI | P | |
| To a To a Prob | understan apply the develop t blem. | nd mathematical models ese techniques constructive | used in Operations Resear vely to make effective bus natical formulation and So problems. | iness decisions | | ımmir | ıg | |
| To develop mathematical skills to analyze and solve network models. Unit: I Mathematical Formulation of a LPP: General form of a LPP – Summation notation – Matrix form – Canonical form – Standard form - Solution of LPP 2 by Graphical Method - The Simplex Method | | | | | | | | |
| Unit: II | Transportation Problems: Mathematical Formulation of TP - Initial Basic Feasible Solution – North west corner rule- Least cost method- Vogels Approximation method - Optimum solution of TP (MODI Method). | | | | | | | |
| Unit: III | Assignment Problems: Mathematical formulation of Assignment Problems – Solution to Assignment Problems | | | | | | | |
| Unit: IV | Games and Strategies: Introduction – Two person zero sum game – The Maximin – Minimax Principle - Saddle point – Games without saddle point – Graphic Solution of 2 x n and m x 2 Games – Dominance Property | | | | | | | |
| Unit: V | | k Flow Problems – Min | imal Spanning Tree Prob | | t Rou | te 18 | 3 hrs | |
| | | | | Fotal Lecture | Hou | s 90 |) hrs | |
| Books for Study: Text Book 1: Dr. S. Arumugam and A.Thangapandi Isaac, Topics in Operations Research Linear Programming, New Gamma Publishers Pvt. Ltd, Palayamkottai, Tirunelveli, March 2015. Text Book 2: Kanti Swarup, P.K. Gupta, Man Mohan, Operations Research, 17 th Edition, Sultan Chand and Sons, New Delhi, 2014. | | | | | | | | |
| Unit I : Unit II : Unit III : Unit IV : Unit V : Books for | Text Text Text Text | ± | ction: 4.1 ctions: 5.1 & 5.2 | | | | | |
| Nev 2. Sha | v Delhi, rma J.K. | 2010. | rch Algorithms and App : Problems and Solutions | | | | | |

| Web I | Resources: | | | |
|------------------|---|----|--|--|
| 1. <u>htt</u> | os://nptel.ac.in/courses/111/107/111107128/ | | | |
| 2. <u>htt</u> | <u>ps://onlinecourses.swayam2.ac.in/cec20_ma10/preview</u> | | | |
| Course Outcomes: | | | | |
| After | the completion of the course, Students will be able to | | | |
| CO1: | Develop the notions about Mathematical formulation and Solving Linear Programming Problem. | K4 | | |
| CO2: | Acquire the knowledge about the view of transportation and assignment problems. | К3 | | |
| CO3: | Identify and develop the real life problems into network problems. | K3 | | |
| CO4: | Distinguish a game situation from a pure individuals decision problems | K4 | | |
| CO5: | Understand the Mathematical tools that are needed to solve various optimization problems. | К3 | | |

CO & PO Mappings:

| COS | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
|------|------|------|------|------|------|------|
| CO 1 | 2 | 3 | 2 | 2 | 3 | 2 |
| CO 2 | 2 | 3 | 3 | 2 | 2 | 2 |
| CO 3 | 2 | 2 | 2 | 2 | 2 | 3 |
| CO 4 | 2 | 3 | 2 | 2 | 2 | 2 |
| CO 5 | 2 | 2 | 3 | 2 | 2 | 3 |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| UNIT | COURSE NAME | Hrs | Pedagogy |
|------|---|-----|--|
| I | Mathematical Formulation of a LPP: General form of a LPP (2 hrs) – Summation notation – Matrix form – Canonical form (4 hrs) – Standard form (2 hrs) - Solution of LPP by Graphical Method. (7 hrs) - The Simplex Method (8 hrs) | 23 | Chalk & Talk , LCD |
| II | Transportation Problems: Mathematical Formulation of TP (4 hrs)- Initial Basic Feasible Solution (all methods) (7 hrs)- Optimum solution of TP (MODI Method). (7 hrs) | 18 | Chalk & Talk , PPT |
| III | Assignment Problems : Mathematical formulation of Assignment Problems(3 hrs) – Solution to Assignment Problems. (7 hrs) – Travelling Salesman Problem (5 hrs) | 15 | Chalk & Talk , Seminar |
| IV | Games and Strategies: Introduction – Two person zero sum game (1 hr) – The Maximin – Minimax Principle(3 hrs) - Saddle point (2 hrs) – Games without saddle point (3 hrs) – Graphic Solution of 2 x n and m x 2 Games (3 hrs) – Dominance Property (4 hrs) | 16 | Chalk & Talk , Group Discussion |
| V | Network Flow Problems(5 hrs) – Minimal Spanning Tree Problem (6 hrs)– Shortest Route Problems(7 hrs) | 18 | Chalk & Talk , PPT |

Course Designed By: Dr. S. Suriyakala and Dr. M. Sasikala

| | Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs) | | | | | | | | | | |
|---------------|--|--|--------------------------|-----------|----------------------|-----------|---------------------|---------------------|--|--|--|
| Into | | K Level | Section A MCQs | | Secti Short A | on B | Section C | Section | | | |
| Inte rnal | Cos | | No. of. Questio ns | K - Level | No. of. Questions | K - Level | Either or Choice | D Open Choice | | | |
| CI | CO1 | K4 | 2 | K1 & K2 | 1 | K2 | 2 (K3 & K3) | 1 (K4) | | | |
| AI | CO2 | K3 | 2 | K2 & K2 | 2 | K2 & K2 | 2 (K3 & K3) | 2 (K3) | | | |
| CI | CO3 | K3 | 2 | K1& K2 | 1 | K2 | 2 (K3 & K3) | 2 (K3) | | | |
| AII | CO4 | K4 | 2 | K2 & K2 | 2 | K2 & K2 | 2 (K4 & K4) | 1 (K4) | | | |
| | | No. of Questions to be asked | 4 | | 3 | | 4 | 3 | | | |
| - | estion tern | No. of Questions to be answered | 4 | | 3 | | 2 | 2 | | | |
| CIA I & II | | Marks for each question | 1 | | 2 | | 5 | 10 | | | |
| | | Total Marks for each section | 4 | | 6 | | 10 | 20 | | | |

| | Distribution of Marks with K Level CIA I & CIA II | | | | | | | | | |
|-----|---|--|---|---|-------------------------------|----------------|--------------------------------------|---------------------|--|--|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % | | |
| | K1 | 1 | - | - | - | 1 | 1.67 | 16.67 | | |
| | K2 | 3 | 6 | - | - | 9 | 15 | 10.07 | | |
| CIA | K3 | - | - | 20 | 20 | 40 | 66.67 | 66.67 | | |
| I | K4 | - | - | - | 10 | 10 | 1.67 | 1.67 | | |
| • | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 | | |
| | K1 | 1 | - | - | - | 1 | 1.67 | 16.67 | | |
| | K2 | 3 | 6 | - | - | 9 | 15 | 10.07 | | |
| CIA | K3 | - | - | 10 | 20 | 30 | 50 | 50 | | |
| II | K4 | - | - | 10 | 10 | 20 | 33.33 | 33.33 | | |
| | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 | | |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

| S | Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs) | | | | | | | | | |
|---------|---|--------------|---------------|-----------|-------------|---------------|----------------|-----------|--|--|
| | | V | MCQs | | · / | Short Answers | | Section D | | |
| S.No | COs | K - Level | No. of | K – | No. of | K – | (Either / or | (Open | | |
| | | Level | Questions | Level | Question | Level | Choice) | Choice) | | |
| 1 | CO1 | K4 | 2 | K1&K2 | 1 | K1 | 2 (K3 &K3) | 1 (K4) | | |
| 2 | CO2 | K3 | 2 | K1&K2 | 1 | K1 | 2 (K3 &K3) | 1 (K3) | | |
| 3 | CO3 | K3 | 2 | K1&K2 | 1 | K2 | 2 (K3 &K3) | 1 (K3) | | |
| 4 | CO4 | K4 | 2 | K1&K2 | 1 | K2 | 2 (K4 &K4) | 1 (K4) | | |
| 5 | CO5 | K3 | 2 | K1&K2 | 1 | K2 | 2 (K3 &K3) | 1 (K3) | | |
| No. o | of Questic | ons to be | 10 | | 5 | | 10 | 5 | | |
| | Asked | ļ | 10 | | 3 | | 10 | 3 | | |
| No. o | of Questic | ons to be | 10 | | 5 | | 5 | 3 | | |
| | answered | | 10 | | 5 | | 5 | 5 | | |
| Mark | Marks for each question | | 1 | | 2 | | 5 | 10 | | |
| Tota | Total Marks for each | | 10 | | 10 | | 25 | 30 | | |
| section | | | 10 | | 10 | | 25 | 30 | | |
| | (Figures | in parenth | esis denotes, | questions | should be a | sked wit | th the given K | level) | | |

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| Distribution of Marks with K Level | | | | | | | | | | |
|------------------------------------|---|---|-------------------------------------|--------------------------------|----------------|--------------------------------------|-------------------|--|--|--|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % | | | |
| K1 | 5 | 4 | - | - | 9 | 7.5 | 16.67 | | | |
| K2 | 5 | 6 | - | - | 11 | 9.17 | 10.07 | | | |
| K3 | - | - | 40 | 30 | 70 | 58.33 | 58.33 | | | |
| K4 | - | - | 10 | 20 | 30 | 25 | 25 | | | |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 | | | |
| | NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels. | | | | | | | | | |

| | - | - | ice Questions) |
|-----------------|------------------|-----------------------|--|
| | | uestions | (10x1=10 marks) |
| Q.No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| | | ort Answei | · |
| | · | uestions | (5x2=10 marks) |
| Q.No | CO | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| | | her/Or Ty | |
| | - | uestions | (5 x 5 = 25 marks) |
| Q.No | CO | K Level | Questions |
| <u>16) a</u> | CO1 | K3 | |
| 16) b | CO1 | K3 | |
| <u>17) a</u> | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K4 | |
| 19) b | CO4 | K4 | |
| 20) a | CO5 | K3 | |
| 20) b | CO5 | K3 | |
| | - | - | ormance of the students is to be assessed by attempting higher |
| level of | | | |
| | • | en Choice | |
| | • | Three ques K Level | |
| Q.No 21 | CO CO1 | K Level K4 | Questions |
| | | | |
| $\frac{22}{23}$ | CO2 | K3 K3 | |
| 23 24 | CO3 CO4 | K3 K4 | |
| 24 | C04 C05 | K4 K3 | |
| 23 | 005 | КJ | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | APPLIED MICROB | IO | LOGY | | | | | |
|-----------------------|--|----------|--|------------------|------------------------------|-----------------|--------|------|
| Course Code | 21UMBA42 | | | | | | | С |
| Category | ALLIED MICROBIOLOGY - II | | | | | | | 4 |
| Nature of course | ENTREPREN | URSI | HIP | \checkmark | | | | |
| Course Objectiv | | | | | | | | |
| | le information regardin | | | | | | | |
| | he Knowledge about m | | | nme | nts | | | |
| | to isolate industrially in | - | - | | | | | |
| | stand the key concepts | | | | | | | |
| | e various basic concept | | f medical microbiolog | gy | | | 10 | |
| | cultural microbiology | | | | | | 18 | |
| | properties - Soil micro | | | | | | | |
| | en and phosphorus. | | | | | re: E | Bacte | rial |
| | izobium, Bacterial inse | | eides - Bacillus thurin | gien | sis. | | 10 | |
| | ronmental microbiolo | <u> </u> | | | | | 18 | |
| | Microbial assessment | | | | | | | |
| 1 2 | - sewage water treati | mer | t-primary, secondary | / and | d tertiary - Mi | crobe | s in | the |
| production of bio | 0 | | | | | | 10 | |
| | strial microbiology | | D ! (D | | | | 18 | |
| | ortant microorganism | | | | | | | |
| | ications -microbial pro | odu | ction of Industrial pr | odu | cts - Ethanol, I | enici | llin a | and |
| vitamin B12. | | | | | | | 10 | |
| Unit: IV Food | | | · · · · · 1.1. · · · 1 · · · · · · · · · | C. | | | 18 | |
| | organisms in food (bac | | | | | | | |
| | fluence microbial gr | | | | | insic | Tacto | ors. |
| | as food - SCP, edible n | nusi | inouns. Froundies an | u in | en benefits. | | 18 | |
| | ical microbiology ora of the human body | | ala of normal flora | ha | national and ha | | - | ota |
| | diseases -Typhoid, He | | | | | IIIIIUI | CIIC | cis. |
| | ruiseases - rypholu, rie | pai | nis, Asperginosis & I | | tal Lecture Ho | INC | 90 H | ma |
| | | | | 10 | lai Lecture 110 | uis | 90 II | 15 |
| Text Books: | | | | | | | | |
| | U. Biotechnology, 12 th | | | | | | | |
| | man K AND Wood D, | Pro | escott's Microbiolog | y. 11 | 1 th Edition. McC | Graw | Hill | |
| education, 201 | | | | | | | | |
| - | d Crueger A. Biotechno | - | | lust | rial Microbiolo | 9 gy , 2 | nd | |
| | na Publishing Company | , N | ew Delhi, 2000. | | | | | |
| Books For Refe | | | | | | | | |
| - | el. Environmental asp | pect | s of Microbiology, 1 | st ed | ition, Bright Su | n | | |
| publications, C | Chennai, 1999. | | | | | | | |
| 2. Mitchell R. In | troduction to Environ | me | ntal Microbiology, F | Print | ice Hall. Inc., E | nglew | vood | |
| 1 | rsey, 1974. | | | | | | | |

3. Patel A.H. Industrial microbiology, 2nd edition, Mac Millan India Ltd., New Delhi, 2005.

- 4. Sivashankar B. Food Processing and Preservation, Eastern Economy edition, PHI Learning Pvt. Ltd., New Delhi, 2009.
- 5. SubbaRao N.S. **Soil Microbiology**, 4th edition, Oxford and BH Publishing Co. Pvt. Ltd., New Delhi, 2004.

| , - | | | | | | | |
|--------------------|--|----------|--|--|--|--|--|
| Web Res | ources: | | | | | | |
| 1. <u>http://w</u> | www.swayam.gov.in/ | | | | | | |
| 2.http://w | www.nptel.ac.in/ | | | | | | |
| 3. <u>https://</u> | www.sciencedirect.com/food-microbiology | | | | | | |
| COURSE | OUTCOME | K Level | | | | | |
| On succe | On successful completion of the course, the learners will be able to | | | | | | |
| CO1: | Recognize the Beneficial microorganism in agriculture | Up to K2 | | | | | |
| CO2: | Experiment with the role of microbes present in air and water. | Up to K3 | | | | | |
| CO3: | Analyze and compare the important microorganisms in food | Up to K4 | | | | | |
| CO4: | Examine the Industrially important microorganisms and its products. | Up to K4 | | | | | |
| CO5: | Summarize the importance of microbes in human diseases | Up to K3 | | | | | |

CO & PO Mapping:

| COs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
|------|------|------|-------------|------|------|-------------|
| CO 1 | 3 | 3 | 3 | 3 | 2 | 2 |
| CO 2 | 3 | 3 | 3 | 3 | 3 | 2 |
| CO 3 | 3 | 3 | 3 | 3 | 3 | 1 |
| CO 4 | 3 | 3 | 3 | 3 | 3 | 2 |
| CO5 | 3 | 3 | 3 | 3 | 3 | 2 |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

| Unit | Course Name | Hrs | Mode |
|------|---|-----|------------------------------------|
| I | Agricultural microbiology - Soil - general properties - Soil microflora and its importance. Microbial transformation of Carbon, Nitrogen and phosphorus. Beneficial microorganism in agriculture: Bacterial biofertilizer – Rhizobium, Bacterial insecticides - <i>Bacillus</i> <i>thuringiensis</i> | 18 | Chalk and talk, PPT |
| ш | Environmental microbiology - Microbes in air - Microbial assessment of air quality - Microbes in water - Microbial assessment of water quality - sewage water treatment-primary, secondary and tertiary - Microbes in the production of biogas | 18 | Chalk and talk, PPT |
| ш | Industrial microbiology- Industrially important microorganisms- Bioreactors / Fermenter-components of typical fermenter - applications -microbial production of Industrial products–Ethanol, Penicillin and vitamin B12 | 18 | Chalk and talk, PPT |
| IV | Food microbiology -Important microorganisms in food (Bacteria, Molds and Yeasts) Sources of contamination of food. Factors that influence microbial growth in food - Intrinsic factors -extrinsic factors. Microorganisms as food - SCP, edible mushrooms. Probiotics and their benefits. | 18 | Chalk and talk, PPT |
| v | Medical microbiology - Normal micro flora of the human body- role of normal flora – beneficial and harmful effect. Important human diseases -Typhoid, Hepatitis, Aspergillosis & Malaria. | 18 | Chalk and talk, PPT, Assignment |

Course Designed by: 1. Dr. S. Subramani, Assistant Professor. 2. Ms. C. Thenmozhi, Assistant Professor.

Volume IV – Science Syllabus / 2022 - 2023 Learning Outcome Based Education & Assessment (LOBE) **Formative Examination - Blue Print** Articulation Mapping – K Levels with Course Outcomes (COs) Section B Section A Section C Section D **MCQs Short Answers** Internal Cos **K** Level Either or Open No. of. No. of. К-Choice Choice K - Level Questions Questions Level CO1 Up to K2 K1& K2 **K2** 1(K2) 2 1 2(K2&K2) CIA I **CO2** 2 2 K2 Up to K3 K1 & K2 2(K2&K3) 2(K3&K3) Up to K4 **CO3** 2 K1 & K2 1 2(K2&K2) 1(K4) K2 CIA II **CO4** Up to K4 2 K1 & K2 2 K2 2(K3&K3) 2(K3&K4) No. of Questions to 4 3 3 4 be asked No. of Ouestions to 4 3 2 2 Question be answered Pattern CIA I & II Marks for 5 1 2 10 each question **Total Marks** for each 4 6 10 20 section

| | Distribution of Marks with K Level CIA I & CIA II | | | | | | | | |
|-----------|---|--|---|---|-------------------------------|----------------|--------------------------------------|---------------------|--|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % | |
| | K1 | 2 | - | - | - | 2 | 3.33 | 67 | |
| | K2 | 2 | 6 | 10 | 20 | 38 | 63.34 | 07 | |
| CIA | K3 | - | - | 10 | 10 | 20 | 33.33 | 33 | |
| I | K4 | - | - | - | - | - | - | - | |
| - | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 | |
| | K1 | 2 | - | - | - | 2 | 3.33 | 24 | |
| CIA | K2 | 2 | 6 | 10 | - | 18 | 30 | 34 | |
| CIA II | K3 | - | - | 10 | 10 | 20 | 33.33 | 33 | |
| 11 | K4 | - | - | - | 20 | 20 | 33.33 | 33 | |
| | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 | |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| S | Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs) | | | | | | | | |
|------------------------------|---|----------------|---------------------------|-------|--------------------------------|-----------------------|--------------------------------------|----------------------------------|--|
| S. No | COs | K - Level | MC No. of Questions | , | Short An No. of Question | swers K – Level | Section C (Either / or Choice) | Section D (Open Choice) | |
| 1 | CO1 | Up to K2 | 2 | K1&K2 | 1 | K2 | 2(K2&K2) | 1(K2) | |
| 2 | CO2 | Up to K3 | 2 | K1&K2 | 1 | K2 | 2(K3&K3) | 1(K3) | |
| 3 | CO3 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2(K3&K3) | 1(K4) | |
| 4 | CO4 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2(K4&K4) | 1(K4) | |
| 5 | CO5 | Up to K3 | 2 | K1&K2 | 1 | K2 | 2(K2&K2) | 1(K3) | |
| No. | of Questi Aske | ons to be d | 10 | | 5 | | 10 | 5 | |
| No. | No. of Questions to be answered | | 10 | | 5 | | 5 | 3 | |
| Mark | s for eacl | n question | 1 | | 2 | | 5 | 10 | |
| Total Marks for each section | | 10 | | 10 | | 25 | 30 | | |
| | (Figures in parenthesis denotes, questions should be asked with the given K level) | | | | | | | | |

| | Distribution of Marks with K Level | | | | | | | | | |
|------------|--|---|-------------------------------------|-------------------------------|----------------|--------------------------------------|-------------------|--|--|--|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % | | | |
| K1 | 5 | - | - | - | 5 | 4.16 | 42 | | | |
| K2 | 5 | 10 | 20 | 10 | 45 | 37.5 | 42 | | | |
| K3 | - | - | 20 | 20 | 40 | 33.33 | 33 | | | |
| K4 | - | - | 10 | 20 | 30 | 25 | 25 | | | |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 | | | |

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

| Answe | r All Q | uestions | (10x1=10 marks) |
|----------|-----------------|------------|--|
| Q.No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| Section | B (Sho | ort Answer | rs) |
| Answe | r <u>All</u> Qu | uestions | (5x2=10 marks) |
| Q.No | CO | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| Section | C (Eit | her/Or Ty | pe) |
| Answe | r All Q | uestions | (5 x 5 = 25 marks) |
| Q.No | CO | K Level | Questions |
| 16) a | CO1 | K1 | |
| 16) b | CO1 | K1 | |
| 17) a | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K4 | |
| 19) b | CO4 | K4 | |
| 20) a | CO5 | K2 | |
| 20) b | CO5 | K2 | |
| | | | ormance of the students is to be assessed by attempting higher |
| level of | | | |
| | | en Choice) | |
| | | Three ques | |
| Q. No | CO | K Level | Questions |
| 21 | CO1 | K2 | |
| 22 | CO2 | K3 | |
| 23 | CO3 | K4 | |
| 24 | CO4 | K4 | |
| 25 | CO5 | K3 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | WATER TREATMENT | | | | | | | | | | |
|--|--|---------------------------|-------------------|--------|--------|--------------|--|--|--|--|--|
| Course Code | 21UCHN41 | | | L | Р | С | | | | | |
| Category | Non Major Elective | | | 2 | - | 2 | | | | | |
| Nature of course | EMPLOYABILITY S | SKILL ORIENTED | ENTREPREN | URS | HIP | \checkmark | | | | | |
| Course Objecti | Course Objectives: | | | | | | | | | | |
| • To Recall th | e hardness of water, boiling, b | oiler feed water and des | alination. | | | | | | | | |
| | er the estimation of hardness of | | | hniqu | ies. | | | | | | |
| To Compare | the ultraviolet treatment, inter | rnal and external conditi | oning and osmo | osis. | | | | | | | |
| - | he break point chlorination, d | | - | | | | | | | | |
| | e the water quality standards, | • 1 | | cess. | | | | | | | |
| | RDNESS OF WATER | 1 0, 0 | | | 06 | | | | | | |
| | pes of impurities present in w | vater - Hardness of water | r - Estimation of | f ha | ardne | | | | | | |
| | d - Domestic water treatment | | | | | | | | | | |
| - | CRILIZATION METHODS | 1 2 | | | 06 | | | | | | |
| Sterilization - Be | oiling - Ozone gas treatment - | - Ultraviolet treatment - | Chlorination – I | Break | p | oint | | | | | |
| chlorination. | 6 6 | | | | 1 | | | | | | |
| Unit: III BO | LER TROUBLES | | | | 06 | | | | | | |
| Boiler feed way | er - Scale and sludge form | nation - Comparison of | f sludge and s | cale | - Bo | iler | | | | | |
| | oval of carbon dioxide and di | | | | | | | | | | |
| | rements of boiler feed water | 20 | | | | U | | | | | |
| | TER CONDITIONING | | | | 06 | | | | | | |
| | ning - Colloidal conditioning | g - Phosphate condition | ning - Calgon d | condit | ionin | ıg - | | | | | |
| | tioning. External conditioning | | | | | | | | | | |
| | vantages and disadvantages of | | | | | | | | | | |
| _ | external conditioning. | 0 1 | | | | | | | | | |
| | SALINATION | | | | 06 | | | | | | |
| Desalination - 1 | Reverse osmosis – Electrodi | ialysis – Thermal disti | llation – Solar | disti | llatio | n – | | | | | |
| Membrane Tech | | 2 | | | | | | | | | |
| | | Tot | tal Lecture Ho | irs | 30 H | rs | | | | | |
| Books for Study | 7: | | | | | | | | | | |
| | Cheremisinoff, Handbook of w | | eatment technol | ogies | , Bos | ston | | | | | |
| | and Johannesburg Melbourne | e, New Delhi, 2002 | | | | | | | | | |
| Books for Refer | | | | | | | | | | | |
| | Industrial Chemistry, Goel pu | - | | | | | | | | | |
| 2. R.V.Shreve, Industrial Chemical Process, Tata McGraw Hill publishing company, 2005, | | | | | | | | | | | |
| Mumbai. | | | | | | | | | | | |
| Web Resources | | | | | | | | | | | |
| | 1. https://youtu.be/ByCMhI2yi2M | | | | | | | | | | |
| | e/XKNDXrlBnLM | | | | | | | | | | |
| | <u>e/aGo0GUAAeuA</u> <u>e/zXKHjS_Q9wE</u> | | | | | | | | | | |
| Course Outcom | | | | K | Lev | el | | | | | |
| | | | | | LCV | U I | | | | | |

Academic Council Meeting Held On 17.05.2022

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| On th | On the completion of the course the student will be able to | | | | | | |
|-------------|---|------------|--|--|--|--|--|
| CO1: | Recall the general characteristics of hardness of water and its estimation. | [Up to K2] | | | | | |
| CO2: | Discuss the sterilization methods and comparison of sludge and scale. | [Up to K3] | | | | | |
| CO3: | Understand the concepts of internal conditioning and external conditioning. | [Up to K3] | | | | | |
| CO4: | Examine the boiler corrosion and demineralization processes. | [Up to K4] | | | | | |
| CO5: | Apply the domestic water treatment and ultraviolet treatment on water analysis. | [Up to K4] | | | | | |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | | | |
|------------------------|--------------------------|------|------|------|------|-------------|--|--|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | | | |
| CO5 | 1 | 3 | 2 | 3 | 2 | 1 | | | | |
| Weightage | 10 | 10 | 10 | 11 | 9 | 11 | | | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| Unit | Course Name | Hrs | Pedagogy |
|------|--|-----|------------------------------------|
| I | HARDNESS OF WATER Introduction - Types of impurities present in water - Hardness of water - Estimation of hardness by EDTA method - Domestic water treatment - water quality standards. | 12 | Chalk, Talk & Power point |
| II | STERILIZATION METHODS Sterilization - Boiling - Ozone gas treatment - Ultraviolet treatment - Chlorination – Break point chlorination. | 12 | Chalk, Talk & Power point |
| III | BOILER TROUBLES Boiler feed water - Scale and sludge formation - Comparison of sludge and scale - Boiler corrosion - Removal of carbon dioxide and dissolved oxygen – Caustic embrittlement - Priming - Foaming - Requirements of boiler feed water. | 12 | Chalk, Talk & Power point |
| IV | WATER CONDITIONING Internal conditioning - Colloidal conditioning - Phosphate conditioning - Calgon conditioning - Carbonate conditioning. External conditioning - Demineralization process - Regeneration of ion exchangers - Advantages and disadvantages of ion exchange process - Difference between internal conditioning and external conditioning. | 12 | Chalk, Talk & Power point |
| V | DESALINATION Desalination - Reverse osmosis – Electrodialysis – Thermal distillation – Solar distillation – Membrane Technologies. | 12 | Chalk, Talk & Power point |

Course Designed by: Dr. A. J. Sunija & Dr. K. Muthupandi





MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | ORGANIC CHEMISTRY – III | | | |
|-----------------|--|-------|-------|--------------|
| Course Code | 21UCHC51 | L | Р | С |
| Category | Core | 6 | - | 6 |
| Nature of cours | e: EMPLOYABILITY 🗸 SKILL ORIENTED ENTREPRENT | JRSH | IIP | \checkmark |
| Course Objecti | ves: | | | |
| | e characteristics of alicyclic compounds, conformational analysis and | Cive | tone | and |
| Muscone. | | | | |
| | er the free radicals and molecular rearrangements. | | | |
| | the heterocyclic compounds, alkaloids and terpenes. the structure and classifications of proteins and nucleic acids. | | | |
| - | the structure and classifications of proteins and nucleic acids. | | | |
| | ICYCLIC COMPOUNDS, CONFORMATIONAL ANALYSIS, | | 18 | |
| | /ETONE AND MUSCONE | | 10 | , |
| Alicyclic comp | ounds: General methods of preparation and properties of cyc | lopar | affin | s – |
| • | theory and its modification. Conformational Analysis: Different | | | |
| <u> </u> | and conformation- Fisher- Saw horse and Newman Projection | | | |
| | l analysis of ethane, n-butane 1,2- dichloroethane, cyclo | | | |
| | ed cyclohexane. Civetone and Muscone any one method of | syn | thesi | s – |
| | (no Structural elucidation) | | 10 | |
| | DLECULAR REARRANGEMENT AND FREE RADICALS | D | 18 | |
| | rrangements: Detailed mechanisms of the following: pinacol - tius, benzil-benzilic acid, claisen, benzidine, Fries and Wagn | | | · · · · |
| | s. Free radicals: Definition – preparation and reactions of she | | | |
| | radicals – Reaction and Mechanism of Sand Meyer reaction | | | |
| <u> </u> | Hofmann-Loeffler reaction – chain reactions – photochemical | | | <u> </u> |
| | ns isomerization. | | | |
| Unit: III HE | TEROCYCLIC COMPOUNDS | | 18 | 5 |
| | ompounds: Introduction and definition, Preparation and basic | | | |
| | ine, quinoline and isoquinoline. Alkaloids: Definition – occ | | | |
| | alkaloids – general methods for determining the structure of | | | |
| | f alkaloids – structural elucidation – coniine, piperine and nicoti | | | |
| | lassification, occurrence and isolation – general properties – iso | - | | le – |
| | Is of determining structure. Properties, Structure of citral and ter | pineo | 1 | |
| | OTEINS AND NUCLEIC ACIDS | 411 | 18 | |
| | nition – Classification of Amino Acids – Zwitter ion – Pep | | | |
| | of proteins – colour reactions of proteins – primary, secondary, ucture of proteins (an elementary idea only). Nucleic acids: | | • | |
| • | of Nucleic acids – nucleosides – nucleotides – difference between | | | |
| | s – RNA and DNA general structure – Basic structure of DNA | | | |
| | NA and RNA – RNA types. | anu | INI (| |
| | INCIPLES AND APPLICATIONS OF SPECTROSCOPY | | 18 | ; |
| | ion– Type of electronic transition – absorption law bathochron | nic s | | |
| | | | | |

hypso chromic shift – hyperchromic and hypochromic effect – applications of UV to organic compounds – Woodward - Fieser calculation of λ max. IR: Introduction – Instrumentation–different regions of IR, finger print regions – fundamental, overtone, Hot bands and combination bands – applications of IR to organic compounds – effect of hydrogen bonding – NH2. NMR: Introduction – Conditions for NMR active – chemical shift – shielding and deshielding effects - factors influencing chemical shift – solvent used (TMS) – splitting of signals –NMR spectra of simple ethanol and anisole.

Total Lecture Hours90 Hrs

Books for Study:

CO5:

6. Soni, P.L and Chawla. H.M, A Textbook of Organic Chemistry, S. Chand & Co., 2007, New Delhi.

Books for References:

9. Jain. M.K and Sharma. S.C, Modern Organic Chemistry, 4th Edition, Vishal Publishing CO., 2016. Jalandhar. 10. Bahl. B.S and ArunBahl, A Textbook of Organic Chemistry, S. Chand & Co., 2012, New Delhi. Jerry March, Advanced Organic Chemistry, 4th Edition, John Wiley & Sons, 1992, New 11. York. Pine, S.H, Organic Chemistry, 5th Edition, McGraw Hill International Edition, Chemistry 12. Series, 1987, New York. 13. Sehan N. Ege, Organic Chemistry – Structure and Reactivity, 3rd Edition, A.I.T.B.S., 1998, New Delhi. 14. Morrison. R.T and Boyd. R.N, Organic Chemistry, 6th Edition, Printice-Hall of India Ltd., 1992, New Delhi. Web Resources: 1. https://youtu.be/uJWy8mPxIzw 2. https://voutu.be/12hmgzeiGo4 3. https://youtu.be/MM4IcBYZrb4 4. https://youtu.be/6OOUDOVWm0M 5. https://youtu.be/YoQORrw_5Yk **Course Outcomes** K Level On the completion of the course the student will be able to Reminiscence the alicyclic compounds, free radicals and proteins and **CO1:** [Up to K2] deliberate the reaction mechanism of aromatic compounds. Prepare the heterocyclic compounds, short lived and long-lived free radicals. **CO2:** [Up to K3] Differentiate between configuration and conformation and distinguish **CO3**: [Up to K3] between proteins and nucleic acids. Interpret the directive influence of substituents on electronic effects and **CO4:** [Up to K4] properties of aromatic compounds. Integrate the reaction mechanism of aromatic compounds and formulate in

the synthetic applications.

[Up to K4]

| Course Outcomes | | | Programme O | utcomes (PC |)s) | |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 |
| CO5 | 1 | 3 | 2 | 3 | 2 | 1 |
| Weightage | 10 | 10 | 10 | 11 | 9 | 11 |

CO & PO Mapping:

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| Unit | Course Name | Hrs | Pedagogy |
|------|--|-----|------------------------------------|
| Ι | ALICYCLIC COMPOUNDS, CONFORMATIONAL ANALYSIS, CIVETONE AND MUSCONE Alicyclic compounds: General methods of preparation and properties of cycloparaffins – Baeyer's strain theory and its modification. Conformational Analysis: Difference between configuration and conformation- Fisher- Saw horse and Newman Projection formulate – Conformational analysis of ethane, n-butane 1,2– dichloroethane, cyclohexane and monosubstituted cyclohexane. Civetone and Muscone any one method of synthesis – Structure only (no Structural elucidation) | 18 | Chalk, Talk & Power point |
| II | MOLECULAR REARRANGEMENT AND FREE RADICALS Molecular rearrangements: Detailed mechanisms of the following: pinacol - Pinacolone, Hofmann, Curtius, benzil-benzilic acid, claisen, benzidine, Fries and Wagner-Meerwein rearrangements. Free radicals: Definition – preparation and reactions of short lived and long-lived free radicals – Reaction and Mechanism of Sand Meyer reaction, Gomberg reaction and Hofmann-Loeffler reaction – chain reactions – photochemical reactions of olefins – cis-trans isomerization. | 18 | Chalk, Talk & Power point |
| III | HETEROCYCLIC COMPOUNDS Heterocyclic compounds: Introduction and definition, Preparation and basic properties of pyrrole, pyridine, quinoline and isoquinoline. Alkaloids: Definition – occurrence and extraction of alkaloids – general methods for determining the structure of alkaloids – classification of alkaloids – structural elucidation – coniine, piperine and nicotine. Terpenes: Introduction, classification, occurrence and isolation – general properties – isoprene rule – general methods of determining structure. Properties, Structure of citral and terpineol. | 18 | Chalk, Talk & Power point |
| IV | PROTEINS AND NUCLEIC ACIDSProteins: Definition – Classification of Amino Acids – Zwitter ion –Peptide bond - Classification of proteins – colour reactions of proteins –primary, secondary, tertiary and quaternary structure of proteins (an | 18 | Chalk, Talk & Power point |

| | elementary idea only). Nucleic acids: Definition – Classification of Nucleic acids – nucleosides – nucleotides – difference between nucleosides and nucleotides – RNA and DNA general structure – Basic structure of DNA and RNA – Functions of DNA and RNA – RNA types. | | |
|---|--|----|------------------------------------|
| V | PRINCIPLES AND APPLICATIONS OF SPECTROSCOPY UV: Introduction– Type of electronic transition – absorption law bathochromic shift and hypso chromic shift – hyperchromic and hypochromic effect – applications of UV to organic compounds – Woodward - Fieser calculation of λ max. IR: Introduction – Instrumentation– different regions of IR, finger print regions – fundamental, overtone, Hot bands and combination bands – applications of IR to organic compounds – effect of hydrogen bonding – NH2. NMR: Introduction – Conditions for NMR active – chemical shift – shielding and deshielding effects - factors influencing chemical shift – solvent used (TMS) – splitting of signals –NMR spectra of simple ethanol and anisole. | 18 | Chalk, Talk & Power point |

Course Designed by: Dr. K. Muthupandi & Dr. A. J. Sunija

| | | | - | | ication & Ass on - Blue Pri | | t (LOBE) | |
|------|-------------------------|---------------------------------------|----------------------|--------------|--------------------------------|--------------|-----------|-----------|
| | | Articulation N | | | | | s (COs) | |
| | | | Section | n A | Section | B | Section C | Section D |
| Inte | Cos | K Level | MCQ | s | Short Ans | swers | Either or | Open |
| rnal | 0.05 | IX LEVEL | No. of. Questions | K – Level | No. of. Questions | K - Level | Choice | Choice |
| CI | CO1 | Up to K2 | 2 | K1 | 1 | K1 | 2 (K2&K2) | 1(K2) |
| AI | CO2 | Up to K3 | 2 | K2 | 2 | K2 | 2 (K3&K3) | 1(K3) |
| CI | CO3 | Up to K3 | 2 | K1 | 1 | K1 | 2 (K2&K2) | 1(K2) |
| AII | CO4 | Up to K4 | 2 | K2 | 2 | K2 | 2 (K3&K3) | 1(K4) |
| | | No. of Questions to be asked | 4 | | 3 | | 4 | 2 |
| Pat | stion tern I & II | No. of Questions to be answered | 4 | | 3 | | 2 | 1 |
| | 1 & 11 | Marks for each question | 1 | | 2 | | 5 | 10 |
| | | Total Marks for each section | 4 | | 6 | | 10 | 10 |

| | | Dist | ribution of 1 | Marks with | K Level C | IAI&(| CIA II | |
|-----|------------|--|---|---|-------------------------------|----------------|--------------------------------------|---------------------|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % |
| | K1 | 2 | 2 | - | - | 4 | 8 | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 |
| CIA | K3 | - | - | 10 | 10 | 20 | 40 | 40 |
| | K4 | - | - | - | - | - | - | - |
| - | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 |
| | K1 | 2 | 2 | - | - | 4 | 8 | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 |
| CIA | K3 | - | - | 10 | - | 10 | 20 | 20 |
| II | K4 | - | - | - | 10 | 10 | 20 | 20 |
| | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| Summ | native Exa | mination – Bl | ue Print Artic | ulation Ma | pping – K I | Level with | Course Outco | mes (COs) |
|-------------------------|-----------------------------------|-----------------|-----------------|-------------|---------------|------------|-----------------|-----------|
| | | | MCQs | | Short Answers | | Section C | Section D |
| S.No | Cos | K - Level | No. of | K – | No. of | K – | (Either / or | (Open |
| | | | Questions | Level | Question | Level | Choice) | Choice) |
| 1 | CO1 | Up to K 2 | 2 | K1,K2 | 1 | K1 | 2 (K2&K2) | 1(K2) |
| 2 | CO2 | Upto K 3 | 2 | K1&K2 | 1 | K1 | 2 (K3&K3) | 1(K3) |
| 3 | CO3 | Up to K 3 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K3) |
| 4 | CO4 | Up to K 4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) |
| 5 | CO5 | Up to K 4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) |
| No. of | Questions | s to be Asked | 10 | | 5 | | 10 | 5 |
| No | No.of Questions to be answered | | 10 | | 5 | | 5 | 3 |
| Marks for each question | | 1 | | 2 | | 5 | 10 | |
| Total N | Total Marks for each section | | 10 | | 10 | | 25 | 30 |
| | (Figu | res in parenthe | esis denotes, q | uestions sh | ould be aske | ed with th | e given K level |) |

| | | Dis | tribution of | Marks with | n K Leve | 1 | |
|---------------------|--|---|-------------------------------------|-------------------------------|----------------|--------------------------------------|-------------------|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % |
| K1 | 5 | 4 | - | - | 9 | 7.5 | 33 |
| K2 | 5 | 6 | 10 | 10 | 31 | 25.83 | |
| K3 | - | - | 40 | 20 | 60 | 50 | 50 |
| K4 | - | - | - | 20 | 20 | 16.67 | 17 |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 |
| NB: Hig of K lev | · · | erformance o | f the students | s is to be asso | essed by a | ttempting | higher level |

| Section | A (Mu | Itiple Cho | ice Questions) |
|----------|---------|------------|--|
| Answei | r All Q | uestions | (10x1=10 marks) |
| Q.No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| Section | B (Sho | ort Answei | rs) |
| Answei | r All Q | uestions | (5x2=10 marks) |
| Q.No | СО | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| Section | C (Eit | her/Or Ty | pe) |
| Answer | r All Q | uestions | (5 x 5 = 25 marks) |
| Q.No | CO | K Level | Questions |
| 16) a | CO1 | K2 | |
| 16) b | CO1 | K2 | |
| 17) a | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K3 | |
| 19) b | CO4 | K3 | |
| 20) a | CO5 | K3 | |
| 20) b | CO5 | K3 | |
| | | | ormance of the students is to be assessed by attempting higher |
| level of | | | |
| | | en Choice | |
| | | Three ques | |
| Q.No | CO | K Level | Questions |
| 21 | CO1 | K2 | |
| 22 | CO2 | K3 | |
| 23 | CO3 | K3 | |
| 24 | CO4 | K4 | |
| 25 | CO5 | K4 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | MAJOR CHEMISTRY PRACTICAL – III (PHYSICAL CHEM EXPERIMENTS) | MIST | RY | |
|---------------------------------|---|--------|---------|-----|
| Course Code | 21UCHCP3 | L | Р | C |
| Category | Core | - | 6 | 5 |
| Nature of cours | e: EMPLOYABILITY 🗸 SKILL ORIENTED 🖌 ENTREPRE | NUR | SHIP | ✓ |
| Course Object | ves: | | | |
| • To learn | the general methods for the determination of molecular weight. | | | |
| • To analy | ze the concept of phase diagram, CST and potentiometric titrations. | | | |
| • To study | the equilibrium constant for the reaction | | | |
| • To deter | mine the relative strength of acids by hydrolysis of ester | | | |
| • To inter | pret the cell constant and conductivity titration between as acid and a | base. | | |
| | of Experiments | | | |
| | nation of Molecular weight by | | | |
| , | mperature method – Sodium thiosulphate pentahydrate | | | |
| , | nethod – Naphthalene as Solvent | | | |
| II. Phase d | agram involving | | | |
| a) Simple eutec | ic b) Compound formation | | | |
| | solution temperature (CST) | | | |
| Determination of | f CST of phenol – water system | | | |
| IV. Potentio | metric titrations | | | |
| (a) HCl Vs NaC | $H \qquad (b) K_2 Cr_2 O_7 Vs FeSO_4.$ | | | |
| V. Partitio | n Coefficient experiments: | | | |
| Study of the eq | alibrium constant for the reaction | | | |
| $KI + I_2 \leftrightarrow KI_3$ | | | | |
| By determining | the partition Co-efficient of I_2 between water an CCl_4 | | | |
| Determination of | f strength of given KI. | | | |
| VI. Kinetic | Determination of relative strength of acids by hydrolysis of ester. | | | |
| VII. Conduc | tivity: Determination of cell constant and conductivity titration betw | veen a | is acid | and |
| a base (HCl Vs | NaOH). | | | |
| | Distribution of Marks (Max. marks – 100) | | | |

| | Dura | tion of examination: 6 hrs | |
|--|---|---|---|
| Regula | ar Test in the Class | : 30 Marks | |
| Observ | vation note book | : 10 Marks | |
| Total | | : 40 Marks | |
| Viva v | voce | : 10 marks | |
| | d Note book | : 10 marks | |
| For co | mpletion of the experiment | : 20 marks | |
| Graph | | : 2 marks | |
| Calcul | ation | : 5 marks | |
| Tabula | ation | : 3 marks | |
| Result | | : 10 marks | |
| Total | | : 60 marks | |
| | | | |
| | | Total Lecture H | lours 45 Hrs |
| Th Pu | | ok of Practical Chemistry, 4 th Revised Edit | ion, Scientific |
| Pu Books 1. J. F Yo | omas. A.O and Mani, Textboo blication, 1976. for Reference: E. Huheey, E. A. Kieter and R. L rk, 1993. | ok of Practical Chemistry, 4 th Revised Edit L. Keiter, Inorganic Chemistry, 4th ed., Harpe Ilo and M. Bochman, Advanced Inorganic Che | r Collins, New |
| Th Pu Books 1. J. F Yo 2. F. A | omas. A.O and Mani, Textboo blication, 1976. for Reference: E. Huheey, E. A. Kieter and R. L rk, 1993. | 2. Keiter, Inorganic Chemistry, 4th ed., Harpe | r Collins, New |
| Th Pu Books 1. J. H Yo 2. F. A John V | omas. A.O and Mani, Textboo blication, 1976. for Reference: E. Huheey, E. A. Kieter and R. I. rk, 1993. A. Cotton, G. Wilkinson, C. Muri Viley, New York, 1999. | 2. Keiter, Inorganic Chemistry, 4th ed., Harpe | r Collins, New emistry,6th ed., |
| Th Pui Books 1. J. F Yo 2. F. A John V 3. T. N | omas. A.O and Mani, Textboo blication, 1976. for Reference: E. Huheey, E. A. Kieter and R. L rk, 1993. A. Cotton, G. Wilkinson, C. Muri Viley, New York, 1999. Moeller, Inorganic Chemistry: A J | 2. Keiter, Inorganic Chemistry, 4th ed., Harpe Ilo and M. Bochman, Advanced Inorganic Che | r Collins, New emistry,6th ed., |
| Th Pu Books 1. J. F Yo 2. F. A John V 3. T. M 4. R. I | omas. A.O and Mani, Textboo blication, 1976. for Reference: E. Huheey, E. A. Kieter and R. L rk, 1993. A. Cotton, G. Wilkinson, C. Muri Viley, New York, 1999. Moeller, Inorganic Chemistry: A J | L. Keiter, Inorganic Chemistry, 4th ed., Harpe llo and M. Bochman, Advanced Inorganic Che Modern Introduction, Wiley, New York, 1990. | r Collins, New emistry,6th ed., |
| Th Pui Books 1. J. F Yo 2. F. A John V 3. T. N 4. R. I Web F | omas. A.O and Mani, Textboo blication, 1976. for Reference: E. Huheey, E. A. Kieter and R. L rk, 1993. A. Cotton, G. Wilkinson, C. Muri Viley, New York, 1999. Moeller, Inorganic Chemistry: A D D Madan S.Chand, Modern Inorg | L. Keiter, Inorganic Chemistry, 4th ed., Harpe llo and M. Bochman, Advanced Inorganic Che Modern Introduction, Wiley, New York, 1990. | r Collins, New emistry,6th ed., |
| Th Pu Books 1. J. H Yo 2. F. A John V 3. T. N 4. R. I Web H 1. http | omas. A.O and Mani, Textboo blication, 1976. for Reference: E. Huheey, E. A. Kieter and R. L rk, 1993. A. Cotton, G. Wilkinson, C. Muri Viley, New York, 1999. Moeller, Inorganic Chemistry: A D D Madan S.Chand, Modern Inorg Resources: ps://youtu.be/2VzEpsEZOYo | L. Keiter, Inorganic Chemistry, 4th ed., Harpe llo and M. Bochman, Advanced Inorganic Che Modern Introduction, Wiley, New York, 1990. | r Collins, New emistry,6th ed., |
| Th Pui Books 1. J. F Yo 2. F. A John V 3. T. N 4. R. I Web F 1. http 2. http | omas. A.O and Mani, Textboo blication, 1976. for Reference: E. Huheey, E. A. Kieter and R. I. rk, 1993. A. Cotton, G. Wilkinson, C. Muri Viley, New York, 1999. Moeller, Inorganic Chemistry: A D D Madan S.Chand, Modern Inorg Resources: | L. Keiter, Inorganic Chemistry, 4th ed., Harpe llo and M. Bochman, Advanced Inorganic Che Modern Introduction, Wiley, New York, 1990. | r Collins, New emistry,6th ed., |
| Th Pu Books 1. J. F Yo 2. F. A John V 3. T. M 4. R. I Web H 1. http 2. http 3. http | omas. A.O and Mani, Textboo blication, 1976. for Reference: E. Huheey, E. A. Kieter and R. L rk, 1993. A. Cotton, G. Wilkinson, C. Muri Viley, New York, 1999. Moeller, Inorganic Chemistry: A D D Madan S.Chand, Modern Inorg Resources: ps://youtu.be/2VzEpsEZOYo ps://youtu.be/2VzEpsEZOYo ps://youtu.be/2WzEpsEZOYo | L. Keiter, Inorganic Chemistry, 4th ed., Harpe llo and M. Bochman, Advanced Inorganic Che Modern Introduction, Wiley, New York, 1990. | r Collins, New emistry,6th ed., |
| Th Pu Books 1. J. F Yo 2. F. A John V 3. T. N 4. R. I Web H 1. http 2. http 3. http 3. http | omas. A.O and Mani, Textboo blication, 1976. for Reference: E. Huheey, E. A. Kieter and R. I. rk, 1993. A. Cotton, G. Wilkinson, C. Muri Viley, New York, 1999. Moeller, Inorganic Chemistry: A I D Madan S.Chand, Modern Inorg Resources: DS://youtu.be/2VzEpsEZOYo DS://youtu.be/2VzEpsEZOYo DS://youtu.be/Xwm98B3gLPw DS://youtu.be/KD7amFclq4s | L. Keiter, Inorganic Chemistry, 4th ed., Harpe llo and M. Bochman, Advanced Inorganic Che Modern Introduction, Wiley, New York, 1990. ganic Chemistry band Co.Ltd, New Delhi 2012 | r Collins, New emistry,6th ed., |
| Th Pu Books 1. J. F Yo 2. F. A John V 3. T. N 4. R. I Web H 1. http 2. http 3. http 3. http | omas. A.O and Mani, Textboo blication, 1976. for Reference: E. Huheey, E. A. Kieter and R. L rk, 1993. A. Cotton, G. Wilkinson, C. Muri Viley, New York, 1999. Moeller, Inorganic Chemistry: A D D Madan S.Chand, Modern Inorg Resources: Dis://youtu.be/2VzEpsEZOYo Dis://youtu.be/2VzEpsEZOYo Dis://youtu.be/Xwm98B3gLPw Dis://youtu.be/KD7amFclq4s te Outcomes: The completion of the course the second | L. Keiter, Inorganic Chemistry, 4th ed., Harpe llo and M. Bochman, Advanced Inorganic Che Modern Introduction, Wiley, New York, 1990. ganic Chemistry band Co.Ltd, New Delhi 2012 | r Collins, New emistry,6th ed., |
| Th Pu Books 1. J. F Yo 2. F. A John V 3. T. N 4. R. I Web H 1. http 3. http 3. http 3. http Cours On th | omas. A.O and Mani, Textboo blication, 1976. for Reference: E. Huheey, E. A. Kieter and R. I. rk, 1993. A. Cotton, G. Wilkinson, C. Muri Viley, New York, 1999. Moeller, Inorganic Chemistry: A I D Madan S.Chand, Modern Inorg Resources: ps://youtu.be/2VzEpsEZOYo ps://youtu.be/Xwm98B3gLPw ps://youtu.be/KD7amFclq4s te Outcomes: The completion of the course the set of the course the course the set of the | L. Keiter, Inorganic Chemistry, 4th ed., Harpe llo and M. Bochman, Advanced Inorganic Che Modern Introduction, Wiley, New York, 1990. ganic Chemistry band Co.Ltd, New Delhi 2012. student will be able to | r Collins, New emistry,6th ed., K Level [Up to K2] |
| Th Pu Books 1. J. F Yo 2. F. A John V 3. T. N 4. R. I Web H 1. <u>http</u> 2. <u>http</u> 3. <u>http</u> Cours On th | omas. A.O and Mani, Textboo blication, 1976. for Reference: E. Huheey, E. A. Kieter and R. I. rk, 1993. A. Cotton, G. Wilkinson, C. Muri Viley, New York, 1999. Moeller, Inorganic Chemistry: A I D Madan S.Chand, Modern Inorg Resources: D:://youtu.be/2VzEpsEZOYo D:://youtu.be/Xwm98B3gLPw D:://youtu.be/KD7amFclq4s e Outcomes: e completion of the course the second | L. Keiter, Inorganic Chemistry, 4th ed., Harpe llo and M. Bochman, Advanced Inorganic Che Modern Introduction, Wiley, New York, 1990. ganic Chemistry band Co.Ltd, New Delhi 2012 student will be able to right by Transition Temperature method and and CST. | r Collins, New emistry,6th ed., |
| Th Pu Books 1. J. F Yo 2. F. A John V 3. T. M 4. R. I Web H 1. http 2. http 3. http Cours On th CO1: CO2: | omas. A.O and Mani, Textboo blication, 1976. for Reference: E. Huheey, E. A. Kieter and R. I. rk, 1993. A. Cotton, G. Wilkinson, C. Muri Viley, New York, 1999. Moeller, Inorganic Chemistry: A I D Madan S.Chand, Modern Inorg Resources: ps://youtu.be/2VzEpsEZOYo ps://youtu.be/Xwm98B3gLPw ps://youtu.be/KD7amFclq4s te Outcomes: The completion of the course the set of the course the course the set of the | L. Keiter, Inorganic Chemistry, 4th ed., Harpe Illo and M. Bochman, Advanced Inorganic Che Modern Introduction, Wiley, New York, 1990. ganic Chemistry band Co.Ltd, New Delhi 2012 student will be able to eight by Transition Temperature method and and CST. f acids by hydrolysis of ester. | r Collins, New emistry,6th ed., K Level [Up to K2] |

| Course Outcomes | | | Programme O | utcomes (PC |)s) | |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 |
| CO5 | 2 | 3 | 1 | 3 | 2 | 1 |
| Weightage | 11 | 10 | 9 | 11 | 9 | 11 |

CO & PO Mapping:

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| UNIT | List of Experiments | Hrs | Mode |
|------|--|-----|-----------|
| Ι | I. Determination of Molecular weight by | | |
| | a) Transition Temperature method – Sodium thiosulphate | | |
| | pentahydrate | | |
| | b) Rast Macro method – Naphthalene as Solvent | | |
| | II. Phase diagram involving | | |
| | a) Simple eutectic b) Compound formation | | |
| | III. Critical solution temperature (CST) | | |
| | Determination of CST of phenol – water system | | |
| | IV. Potentiometric titrations | | |
| | (a) HCl Vs NaOH (b) $K_2Cr_2O_7$ Vs FeSO ₄ . | | |
| | V. Partition Coefficient experiments: | 90 | Practical |
| | Study of the equilibrium constant for the reaction | | |
| | $KI+I_2 \leftrightarrow KI_3$ | | |
| | By determining the partition Co-efficient of I2 between water an | | |
| | CCl ₄ | | |
| | Determination of strength of given KI. | | |
| | VI. Kinetics: Determination of relative strength of acids by | | |
| | hydrolysis of ester. | | |
| | VII. Conductivity: Determination of cell constant and | | |
| | conductivity titration between as acid and a base (HCl Vs NaOH). | | |

Course Designed by: Dr. A. J. Sunija & Dr. V. Ramasamy Raja



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name MAJOR CHEMISTRY PRACTICAL – IV (GRAVIMETRIC ANALYSIS AND ORGANIC PREPARATION) | | | | | | | |
|--|---|---|---|---|--|--|--|
| Course Code | 21UCHCP4 | L | Р | С | | | |
| Category | Core | - | 3 | - | | | |
| Nature of course: EMPLOYABILITY 🗸 SKILL ORIENTED 🖌 ENTREPRENURSHI | | | | | | | |
| Course Objecti | ves: | | | | | | |
| To learn | the concept of gravimetric analysis and organic preparation | | | | | | |
| • To analy | ze the estimation of lead, calcium, copper and nickel | | | | | | |
| • To study | the organic preparation methods | | | | | | |
| • To under | rstand the various organic preparation methods | | | | | | |
| • To interp | pret the gravimetric analysis and organic preparation | | | | | | |
| List | t of Experiments | | | | | | |
| 1. Gravim | etric Analysis | | | | | | |
| Estin | mation of lead as lead chromate mation of barium as barium chromate mation of calcium as calcium oxalate monohydrate mation of copper as cuprous thiocyanate mation of nickel as Ni DMG. Preparation ration trobenzene from nitrobenzene ric acid from phenol mination: p-bromo acetanilide from acetanilide hrolysis : Aromatic acid from (a) an ester (b) an amide dation: Benzoic acid from benzaldehyde. azoylation: (a) Amine (b) phenols. atylation : (a) Amine (b) phenols | | | | | | |
| Distribution of Marks (Max.marks – 100) Duration of examination: 6 hrs Int: 40 Regular Test in the Class : 30 Marks Observation note book : 10 Marks | | | | | | | |
| Total | : 40 Marks | | | | | | |

Volume VI – Science Syllabus / 2023 - 2024 Record Note Book - 10 Marks Viva Voce - 10 Marks Ext: 60 **Organic preparation (10 Marks) Gravimetric Estimation (30 Marks)** Procedure 2 Marks Procedure - 10 Marks Crude sample 6 Marks Estimation - 20 Marks Recrystallised sample -Less than 2 % Error – 20 Marks 2 Marks 2-3% Error – 18 Marks 3-4% Error – 16 Marks 4-5% Error – 14 Marks Greater than 5% Error – 8 Marks Total Lecture Hours | 45 Hrs **Books for Reference:** 1. Thomas. A.O and Mani, Textbook of Practical Chemistry, 4th Revised Edition, Scientific Publication, 1976. 2. N.S. Gnana pragasam and G. Ramamurthy, Organic Chemistry Lab Manual, Viswanath. S. Printers & Publishers Pvt. Ltd., 2010, Chennai. Web Resources: 1. https://youtu.be/tftNgFVAWCY 2. https://youtu.be/npxbO-pzUvU 3. https://youtu.be/peMyqdJ57dA **Course Outcomes:** K Level On the completion of the course the student will be able to **CO1:** Relate and classify between gravimetric analysis and organic preparation [Up to K2] **CO2:** Estimate lead, barium, calcium, copper and nickel. [Up to K3] **CO3:** Analyze the various types of organic preparation. [Up to K3] Interpret the organic preparation like nitration, bromination, hydrolysis, **CO4:** [Up to K4] oxidation, benzoylation and acetylation. Assemble the analyzed and prepared organic compounds samples. CO5: [Up to K4]

| Course Outcomes | Programme Outcomes (POs) | | | | | | |
|------------------------|--------------------------|-------------|-------------|-------------|-------------|-------------|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | |
| CO5 | 2 | 3 | 1 | 3 | 2 | 1 | |
| Weightage | 11 | 10 | 9 | 11 | 9 | 11 | |

CO & PO Mapping:

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| UNIT | List of Experiments | Hrs | Mode |
|------|--|-----|-----------|
| | 1. Gravimetric Analysis | | |
| | Estimation of lead as lead chromate Estimation of barium as barium chromate Estimation of calcium as calcium oxalate monohydrate Estimation of copper as cuprous thiocyanate Estimation of nickel as Ni DMG. | | |
| Ι | 2. Organic Preparation | 45 | Practical |
| | 1. Nitration | | |
| | a. M-dinitrobenzene from nitrobenzene | | |
| | b. Picric acid from phenol | | |
| | 2. Bromination: p-bromo acetanilide from acetanilide | | |
| | 3. Hydrolysis : Aromatic acid from (a) an ester (b) an amide | | |
| | 4. Oxidation: Benzoic acid from benzaldehyde. | | |
| | 5. Benzoylation: (a) Amine (b) phenols. | | |
| | 6. Acetylation : (a) Amine (b) phenols | | |

Course Designed by: Dr. K. Muthupandi & Dr. V. Ramasamy Raja



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| | ESTIMATION) | | PRACI | FICAL – V (| (ORG) | ANIC | C ANA | LYSI | IS A | AND | |
|---|---|---------------------------|--------------|--|--|-----------------------|--------|----------------------|----------------------------|----------------------------------|--------------|
| Course Code | 21UCHCP5 | | | | | | |] | [] | Р | C |
| Category | Core | | | | | | | | - | 3 | - |
| Nature of course: | EMPLOYAB | LITY | SKILI | L ORIENTE | D 🗸 | EN I | REP | RENU | JRS | SHIP | \checkmark |
| Course Objectiv | es: | | | | | | | | | | |
| • To learn the | he analysis of an | organic | compou | nd containin | g one o | or two | o func | tional | gro | ups. | |
| | e the concept of | | | | | | | | | | |
| compound | | | | | | | | | - | | |
| • | estimation of phe | | | - | | | | | | | |
| | tand the various | | | - | - | | | | | | |
| | et organic analy | sis and e | stimation | n of organic | compo | unds | | | | | |
| List I. Organic Analy | of Experiments | | | | | | | | | | |
| | ls, amines (prim ar halogen comp STIMATION | | | | | | | | | | |
| Estimation Estimation Estimation | n of aniline | | | | | | | | | | |
| 2. Estimation | n of aniline n of glucose | istributi | ion of M | a rks (M ax. : | marks | - 100 |)) | | | | |
| 2. Estimation | n of aniline n of glucose | | | a rks (Max.) mination: 6 l | | - 100 |)) | | | | |
| Estimation Estimation | n of aniline n of glucose D | | | | | - 100 |)) | | | | |
| 2. Estimation | n of aniline n of glucose D ne Class : 30 | Duratio | | | | - 100 |)) | | | | |
| Estimation Estimation Regular Test in the set of | n of aniline n of glucose D ne Class : 30 book : 10 | Duratic Marks | | | | - 100 |)) | | | | |
| Estimation Estimation Regular Test in the Observation note | n of aniline n of glucose D ne Class : 30 book : 10 : 40 | Duratic Marks Marks | | mination: 61 | | | | 0 Mar | ·ks) | | |
| Estimation Estimation Estimation Regular Test in the Observation note Total Organic estimation | n of aniline n of glucose D ne Class : 30 book : 10 : 40 ion (30 Marks) | Duratic Marks Marks | | mination: 61 | nrs | | | 0 Mar – 10 | | | |
| Estimation Estimation Estimation Regular Test in the Observation note Total Organic estimation Record Note - 1 | n of aniline n of glucose D ne Class : 30 book : 10 : 40 ion (30 Marks) | Duratic Marks Marks | | mination: 6 l | nrs ganic : | analy | | | ma | ırks | |
| 2. Estimation 3. Estimation 3. Estimation Regular Test in the Observation note Total Organic estimation Record Note - 1 Procedure - 5 | n of aniline n of glucose D ne Class : 30 book : 10 : 40 ion (30 Marks) .0 marks | Duratic Marks Marks | | mination: 6 l Or Viva Voce | ırs ganic : y react | analy ion | | - 10 | ma narl | urks <s< td=""><td></td></s<> | |
| 2. Estimation 3. Estimation 3. Estimation 3. Estimation Regular Test in the Observation note Total Organic estimation Record Note - 1 Procedure - 5 Estimation - 1 Less than 3% Error | n of aniline n of glucose D ne Class : 30 book : 10 : 40 ion (30 Marks) 0 marks marks 5 marks | Duratic Marks Marks | | mination: 6 h Or Viva Voce Preliminar | ganic a y react present or aron | analy ion natic | sis (3 | – 10 - 2 n | ma nark nark nark | urks cs cs cs | |

| | | Volume VI – Science Sy | - | 2024 |
|----------------|---|------------------------------------|------------------|-----------|
| | | | | |
| | 4-5% Error – 10 Marks | Functional group | - 6 marks | |
| | Greater than 5% - 8 Marks | Derivative | - 2 marks | |
| | | Total L | ecture Hours | 45 Hrs |
| Books | for Reference: | | | |
| 3. Th | omas. A.O and Mani, Textbook o | f Practical Chemistry, 4th Revi | ised Edition, So | cientific |
| Public | ation, 1976. | • | | |
| 4. N.S | S. Gnana pragasam and G. Ramam | urthy, Organic Chemistry Lab | Manual, Viswar | nath. S. |
| Printer | s & Publishers Pvt. Ltd., 2010, Chen | nai. | | |
| Web R | lesources: | | | |
| 1. http | s://youtu.be/1uJk4K_irP8 | | | |
| 2. http | s://youtu.be/xQJOfAKgSOY | | | |
| 3. <u>http</u> | <u>s://youtu.be/xMjJxjhJWj4</u> | | | |
| Course | e Outcomes: | | K | Level |
| On th | e completion of the course the stud | ent will be able to | | |
| CO1: | Relate and classify between organic | e analysis and estimation of organ | nic r | to K2] |
| COI | compounds | | lob | 10 K2j |
| CO2: | Estimate the phenol, aniline and glu | lcose | [Up | to K3] |
| CO3: | Analyze the one or two functional g | roups of organic compounds | [Up | to K3] |
| CO4: | Interpret the organic analysis and es | stimation of organic compounds | [Up | to K4] |
| CO5: | Distinguish between analysis and es of organic compounds | stimation of one or two functional | l groups [Up | to K4] |

CO & PO Mapping:

| Course Outcomes | | | Programme O | utcomes (PC | s) | |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 |
| CO5 | 2 | 3 | 1 | 3 | 2 | 1 |
| Weightage | 11 | 10 | 9 | 11 | 9 | 11 |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| UNIT | List of Experiments | Hrs | Mode |
|------|--|-----|-----------|
| I | I. Organic Analysis Analysis of an organic compound containing one or two functional groups and confirmation by the preparation of a solid derivative – acids, phenols, aldehydes, ketone, esters, nitro compounds, amines (primary, secondary and tertiary), aniline, aliphatic diamide, side chain and nuclear halogen compounds, diamide containing sulphur and monosaccharide. II. ORGANIC ESTIMATION Estimation of phenol Estimation of glucose | 45 | Practical |

Course Designed by: Dr. V. Ramasamy Raja & Dr. K. Muthupandi



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | ANALYTICAL CHEMISTRY | | | |
|---------------------------------------|--|---------|--------|------|
| Course Code | 21UCHE51 | L | Р | С |
| Category | CORE ELECTIVE | 5 | - | 5 |
| Nature of cours | e: EMPLOYABILITY 🗸 SKILL ORIENTED 🖌 ENTREPREN | URS | HIP | ✓ |
| Course Objecti | ves: | | | |
| • To Recall th | e principle involved in the gravimetric analysis. | | | |
| To Rememb | er the methods of precipitation and classification of errors. | | | |
| To Analysis | the instrumental methods and its principles and applications. | | | |
| • To Know the | e photocatalytic reactor and photocatalytic calorimeter. | | | |
| | theory of chromatographic technique and applications. | | | |
| Unit: I PR | INCIPLES OF GRAVIMETRIC ANALYSIS | | 15 | |
| Introduction to | gravimetric analysis - precipitation methods - conditions for p | recip | itatio | n - |
| supersaturation | and precipitate formation - the purity of the precipitate: co-precip | oitatio | n - j | post |
| precipitation - s | solubility product and precipitation - precipitation from homogeneous | ous s | olutic | on - |
| washing of the p | precipitate - organic precipitants: dimethylglyoxime, cupferron, oxine | and c | uproi | 1. |
| Unit: II ER | ROR ANALYSIS | | 15 | |
| Classification o | f errors - determinate errors (systematic errors) and indeterminate | (rand | lom | and |
| accidental) - min | nimization of errors: calibration of apparatus, analysis of standard san | nples, | runn | ing |
| a blank determi | nation and independent analysis - absolute and relative error - typ | es of | erro | rs - |
| | terminate errors and indeterminate errors - precision and accuracy: | | | |
| | culation of mean - median and standard deviation - F-test, t- test | | Q-te | st - |
| | - method of least squares - significant figures - rounding off the value | | | |
| | ERMO ANALYTICAL AND ELECTRO ANALYTICAL METH | | 15 | |
| - | tical Methods: Thermogravimetric analysis (TGA): principle - therm | | • | |
| | no gravimetry (DTG) - factors affecting thermogram - TGA | | | |
| | hermo gravimetry - differential thermal analysis (DTA), DTA instru | | | |
| | e monohydrate. Electro Analytical Methods: Electrogravimetry | | | • |
| ÷ | netals - polarography - principles and applications - amperometr | ic tit | ratior | 18 - |
| principles and a | | | | |
| | TRUMENTAL METHODS OF ANALYSIS | | 15 | |
| · · · · · · · · · · · · · · · · · · · | imentation and applications of fluorimetry - nephelometry - flame | - | | ry - |
| | on spectrophotometry - photocatalytic reactor and photoelectric colorin | meter | | |
| | ROMATOGRAPHY | 1 | 15 | |
| · · · · · · · · · · · · · · · · · · · | ication, definition of terms, principles, basic theory of chromatograp | | | |
| 1 | dling. Band broadening and column efficiency: Definition, plate th | • | | |
| - | atographic technique, their limitation and applications. Basic principle | | | |
| | natography – Column Chromatography – Thin layer Chromatography – Ion exchange Chromatography – Applications of each technique. | apny | - ra | iper |
| Chiomatograph | <u>Total Lecture Hor</u> | INC | 75 H | PC |
| Books for Stud | | 415 | 75 11 | 19 |
| | • | ~ . | | |
| 1. R. Gopalan, I | P.S. Subramanian, K. Rengarajan, Elements of Analytical Chemistry, S | Sultar | ı Cha | nd |
| | | | | |

& sons, 3rd edition 2004.

- 2. S.M.Khopkar, Basic concepts of Analytical Chemistry, Wiley Eastern Ltd.
- 3. A.I Vogel, A Text book of Qualitative Inorganic Analysis, ELBS 4th edition, 2002,
- 4. V.K. Srivastava, K.K. Srivastava, Introduction to Chromatography, S. Chand and Company Ltd., 3rd edition,1985.

Books for References:

- 2. P.L. Soni, M. Katyal, Test book of Inorganic Chemistry, Sultan Chand and Sons, Reprint, 2015
- 3. Chatwal Anand, Instrumental methods of chemical analysis, Himalaya Publishing House, 5th edition, 2005

Web Resources:

- 1. https://youtu.be/KHpRNb_38OM
- 2. https://youtu.be/IB3Uni2gRkA
- 3. https://youtu.be/NzbDEjI8IKE
- 4. <u>https://youtu.be/ck0qEruFy_o</u>

| Course | Course Outcomes | | | | | |
|-------------|--|------------|--|--|--|--|
| On th | On the completion of the course the student will be able to | | | | | |
| CO1: | Ability to understand the concept of chromatography | [Up to K2] | | | | |
| CO2: | Discuss the interplanar spacing and principles of gravimetric analysis | [Up to K3] | | | | |
| CO3: | Interpret the methods of obtaining precipitate and types of errors | [Up to K3] | | | | |
| CO4: | Examine the experimental analysis of methods | [Up to K4] | | | | |
| CO5: | Analyze the chromatographic technique and applications | [Up to K4] | | | | |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | |
|-----------------|--------------------------|-------------|-------------|------|-------------|-------------|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | |
| CO5 | 1 | 3 | 2 | 3 | 2 | 1 | | |
| Weightage | 10 | 10 | 10 | 11 | 9 | 11 | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| Unit | Course Name | Hrs | Pedagogy |
|------|--|-----|------------------------------------|
| I | PRINCIPLES OF GRAVIMETRIC ANALYSIS Introduction to gravimetric analysis - precipitation methods - conditions for precipitation - supersaturation and precipitate formation - the purity of the precipitate: co-precipitation - post precipitation - solubility product and precipitation - precipitation from homogeneous solution - washing of the precipitate - organic precipitants: dimethylglyoxime, cupferron, oxine and cupron. | 15 | Chalk, Talk & Power point |
| II | ERROR ANALYSIS Classification of errors - determinate errors (systematic errors) and indeterminate (random and accidental) - minimization of errors: calibration of apparatus, analysis of standard samples, running a blank determination and independent analysis - absolute and relative error - types of errors - correction of determinate errors and indeterminate errors - precision and accuracy: definition and difference - calculation of mean - median and standard deviation - F-test, t- test and Q-test - confidence limit - method of least squares - significant figures - rounding off the values. | 15 | Chalk, Talk & Power point |
| III | THERMO ANALYTICAL AND ELECTRO ANALYTICAL METHODS Thermo Analytical Methods: Thermogravimetric analysis (TGA): principle - thermal analysis – derivative thermo gravimetry (DTG) - factors affecting thermogram - TGA instrument - applications of thermo gravimetry - differential thermal analysis (DTA), DTA instrument- DTA of calcium oxalate monohydrate. Electro Analytical Methods: Electrogravimetry - electrolytic separation of metals - polarography - principles and applications - amperometric titrations - principles and applications. | 15 | Chalk, Talk & Power point |
| IV | INSTRUMENTAL METHODS OF ANALYSIS Principle, instrumentation and applications of fluorimetry - nephelometry - flame photometry - atomic absorption spectrophotometry - photocatalytic reactor and photoelectric | 15 | Chalk, Talk & Power point |

| | colorimeter. | | |
|---|--|----|------------------------------------|
| V | CHROMATOGRAPHY History, Classification, definition of terms, principles, basic theory of chromatographic technique and sample handling. Band broadening and column efficiency: Definition, plate theory and rate theory of chromatographic technique, their limitation and applications. Basic principles of common types of Chromatography – Column Chromatography – Thin layer Chromatography – Paper Chromatography – Ion exchange Chromatography – Applications of each technique. | 15 | Chalk, Talk & Power point |

Course Designed by: Dr. V. Ramasamy Raja & Dr. R. Satheesh

| | Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs) | | | | | | | | | | |
|------------------|--|---------------------------------|---------------------|-----------|----------------------------|-----------|---------------------|---------------------|--|--|--|
| . | | | Section A MCQs | | Section B Short Answers | | Section C | Section D | | | |
| Inte rnal Cos | | K Level | No. of. Question | K – Level | No. of. Question s | K - Level | Either or Choice | D Open Choice | | | |
| CI | CO1 | Up to K2 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | |
| AI | CO2 | Up to K3 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K3) | | | |
| CI | CO3 | Up to K3 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | |
| AII | CO4 | Up to K4 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K4) | | | |
| | | No. of Questions to be asked | 4 | | 3 | | 4 | 2 | | | |
| - | estion tern | No. of Questions to be answered | 4 | | 3 | | 2 | 1 | | | |
| CIA | I & II | Marks for each question | 1 | | 2 | | 5 | 10 | | | |
| | | Total Marks for each section | 4 | | 6 | | 10 | 10 | | | |

| Distribution of Marks with K Level CIA I & CIA II | | | | | | | | | |
|---|--|---|---|---|-------------------------------|----------------|--------------------------------------|---------------------|--|
| | K (Multiple Level Choice Questions | | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % | |
| | K1 | 2 | 2 | - | - | 4 | 8 | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 | |
| CIA | K3 | - | - | 10 | 10 | 20 | 40 | 40 | |
| I | K4 | - | - | - | - | - | - | - | |
| - | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 | |
| | K1 | 2 | 2 | - | - | 4 | 8 | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 | |
| CIA | K3 | - | - | 10 | - | 10 | 20 | 20 | |
| II | K4 | - | - | - | 10 | 10 | 20 | 20 | |
| | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 | |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| Summa | Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs) | | | | | | | | | |
|------------------------------------|---|---------------|-------------------------|--------------|--------------------|--------------|-------------------------|--------------------|--|--|
| | | | MCQs | | Short Answers | | Section C | Section | | |
| S. No | COs | K - Level | No. of Question s | K – Level | No. of Question | K – Level | (Either / or Choice) | D (Open Choice) | | |
| 1 | CO1 | Up to K2 | 2 | K1,K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | |
| 2 | CO2 | Up to K3 | 2 | K1&K2 | 1 | K1 | 2 (K3&K3) | 1(K3) | | |
| 3 | CO3 | Up to K3 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K3) | | |
| 4 | CO4 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | | |
| 5 | CO5 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | | |
| No. of (| Questions | to be Asked | 10 | | 5 | | 10 | 5 | | |
| No. of Questions to be answered | | 10 | | 5 | | 5 | 3 | | | |
| Marks for each question | | 1 | | 2 | | 5 | 10 | | | |
| Total Marks for each section | | 10 | | 10 | | 25 | 30 | | | |
| (| Figures i | n parenthesis | s denotes, qu | estions sl | nould be ask | ed with t | the given K lev | vel) | | |

| | Distribution of Marks with K Level | | | | | | | | | |
|------------|--|---|-------------------------------------|-------------------------------|----------------|--------------------------------------|-------------------|--|--|--|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % | | | |
| K1 | 5 | 4 | - | - | 9 | 7.5 | 33 | | | |
| K2 | 5 | 6 | 10 | 10 | 31 | 25.83 | 55 | | | |
| K3 | - | - | 40 | 20 | 60 | 50 | 50 | | | |
| K4 | - | - | - | 20 | 20 | 16.67 | 17 | | | |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 | | | |
| NR• Hic | oher level of n | erformance o | f the students | s is to be asse | essed by a | ottemnting | higher level | | | |

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

| | | - | ce Questions) |
|------------|---------|-------------|---|
| Answer | | | (10x1=10 marks) |
| Q. No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| | | t Answers | |
| Answer | | | (5x2=10 marks) |
| Q. No | CO | K Level | Questions |
| 11 | C01 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| | | er/Or Typ | |
| Answer | - | | (5 x 5 = 25 marks) |
| Q. No | CO | K Level | Questions |
| 16) a | CO1 | K2 | |
| 16) b | CO1 | K2 | |
| 17) a | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K3 | |
| 19) b | CO4 | K3 | |
| 20) a | CO5 | K3 | |
| 20) b | CO5 | K3 | |
| NB: Hig | her lev | el of perfo | rmance of the students is to be assessed by attempting higher |
| level of l | | | |
| | - | n Choice) | |
| | 1 | nree questi | |
| Q. No | CO | K Level | Questions |
| 21 | CO1 | K2 | |
| 22 | CO2 | K3 | |
| 23 | CO3 | K3 | |
| 24 | CO4 | K4 | |
| | | K4 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | SUPRAMOLECULAR CHEMISTRY | | | | | | | |
|---|---|-------------|-------|--------------|--|--|--|--|
| Course Code | 21UCHE53 | L | Р | С | | | | |
| Category | CORE ELECTIVE | 5 | - | 5 | | | | |
| Nature of cours | e: EMPLOYABILITY 🗸 SKILL ORIENTED 🖌 ENTREPREN | URS | HIP | \checkmark | | | | |
| Course Object | ives: | | | | | | | |
| • To Recall th | e selectivity, kinetic and thermodynamic concepts | | | | | | | |
| • To Remember the ionic and dipole – dipole interactions and hydrogen bonding | | | | | | | | |
| • To Compare the host – guest method and cation binding | | | | | | | | |
| - | the anion and neutral binding and hydrogen binding interactions | | | | | | | |
| To Determine | ne the structure of zeolite and properties of coordination polymers | | | | | | | |
| | FRODUCTION TO SUPRAMOLECULAR CHEMISTRY | | 15 | | | | | |
| | electivity - the lock and key principle and induced-fit model - compler | | - | | | | | |
| operativity and | the chelate effect - preorganisation - binding constants - kinetic and the | nermo | odyna | mic | | | | |
| selectivity. | | | | | | | | |
| | PRAMOLECULAR INTERACTIONS | | 15 | | | | | |
| | interactions: ionic and dipolar interactions - hydrogen bonding - π | -inter | actio | ns - | | | | |
| | teractions - hydrophobic effects - supramolecular design. | | | | | | | |
| | ST - GUEST CHEMISTRY AND CATION BINDING | | 15 | | | | | |
| | Chemistry: Introduction - guests in solution - macrocyclic versus acycl | | | | | | | |
| | sis - template synthesis. Cation Binding: Introduction, crown ethers | | | | | | | |
| | spherands - hemispherands - cryptaspherands - heterocrowns - hete | erocry | /ptan | ds – | | | | |
| calixarenes. | | | | | | | | |
| | ION AND NEUTRAL BINDINGS | | 15 | | | | | |
| - | charged receptaors, electrostatic interactions, electrostatic, hydr | - | | - | | | | |
| | utral receptors, Lewis-acid receptors and anticrowns - metal containi | ng re | cepto | ors - | | | | |
| | tion and anion receptors - neutral binding. | | | | | | | |
| | LID STATE SUPRAMOLECULAR CHEMISTRY | | 15 | | | | | |
| | zeolites: structure, composition, zeolites and catalysis - clathrates - | | | | | | | |
| | mesic acid clathrates - hydroquinone and Dianin"s compound - | C 00 | rdina | tion | | | | |
| polymers: meta | l organic frameworks and properties of coordination polymers. | | | | | | | |
| | Total Lecture Hou | irs | 75 H | rs | | | | |
| Books for Stud | - | | | | | | | |
| | Steed, David R. Turner and Karl J. Wallace, Core Concepts in Supram and Nanochemistry, Johny Wiley & Sons, Ltd., 2007, | nolecu | ular | | | | | |
| Books for Refe | | | | | | | | |
| | Ariga, Toyoki Kunitake, Supramolecular Chemistry – Funda | men | tals | and | | | | |
| | , Advanced Textbook, Original Japanese edition published by Iw | | | | | | | |
| | Tokyo, <u>https://doi.org/10.1007/b137036</u> , Springer-Verlag Berlin Heidel | | | | | | | |
| Web Resource | | 0 | | | | | | |
| | u.be/dsJzRxnz2Qg | | | | | | | |
| | u.be/YbeRLkhYZM0 | | | | | | | |
| | | | | | | | | |

| Course | e Outcomes | K Level | | | | | | | |
|-------------|---|------------|--|--|--|--|--|--|--|
| On th | On the completion of the course the student will be able to | | | | | | | | |
| CO1: | Ability to understand the ionic and dipole – dipole interactions and hydrogen | [Up to K2] | | | | | | | |
| COI. | bonding | | | | | | | | |
| CO2: | Discuss the host – guest method and cation binding | [Up to K3] | | | | | | | |
| CO3: | Interpret the anion and neutral binding and hydrogen binding interactions | [Up to K3] | | | | | | | |
| CO4: | Examine the structure of zeolite and properties of coordination polymers | [Up to K4] | | | | | | | |
| CO5: | Distinguish between selectivity, kinetic and thermodynamic concepts | [Up to K4] | | | | | | | |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | |
|-----------------|--------------------------|-------------|-------------|------|-------------|-------------|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | |
| CO5 | 1 | 3 | 2 | 3 | 2 | 1 | | |
| Weightage | 10 | 10 | 10 | 11 | 9 | 11 | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| Unit | Course Name | Hrs | Pedagogy |
|------|--|-----|---------------------------|
| | INTRODUCTION TO SUPRAMOLECULAR CHEMISTRY Distillation and fractionation of petroleum. Commercial uses of different | | <i>(</i>], 1 |
| Ι | petroleum fractions. Analysis of petroleum products. Analysis of traces | 15 | Chalk, Talk & Daman |
| | of petroleum products in forensic exhibits. Comparison of petroleum | | Power point |
| | products. Adulteration of petroleum products. | | |
| | SUPRAMOLECULAR INTERACTIONS | | Chalk, |
| II | Supramolecular interactions: ionic and dipolar interactions - hydrogen bonding - π -interactions - van der waals interactions - hydrophobic | 15 | Talk & Power |
| | effects - supramolecular design. | | point |
| | HOST – GUEST CHEMISTRY AND CATION BINDING | | |
| | Host – Guest Chemistry: Introduction - guests in solution - macrocyclic | | |
| | versus acyclic hosts - high dilution synthesis - template synthesis. Cation | | Chalk, Talk & |
| III | Binding: Introduction, crown ethers, lariat ethers and cryptands - | 15 | Power |
| | spherands - hemispherands - cryptaspherands - heterocrowns - | | point |
| | heterocryptands – calixarenes. | | |
| | ANION AND NEUTRAL BINDINGS | | |
| | Anion binding: charged receptaors, electrostatic interactions, | | Chalk, |
| IV | electrostatic, hydrogen binding interactions, neutral receptors, Lewis- | 15 | Talk & Power |
| | acid receptors and anticrowns - metal containing receptors - | | point |
| | simultaneous cation and anion receptors - neutral binding. | | |
| | SOILD STATE SUPRAMOLECULAR CHEMISTRY | | |
| | Introduction - zeolites: structure, composition, zeolites and catalysis - | | Chalk, |
| V | clathrates - urea/thiourea clathrates - trimesic acid clathrates - | 15 | Talk & Power |
| | hydroquinone and Dianin"s compound - coordination polymers: metal | | point |
| | organic frameworks and properties of coordination polymers. | | |

Course Designed by: Dr. A. J. Sunija & Dr. R. Satheesh

| | Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs) | | | | | | | | | | |
|------------------|--|---------------------------------------|----------------------|-------------|-----------------------------|-------------------|----------------------------------|---------------------|--|--|--|
| | | | | on A CQs | | tion B Answers | | Section | | | |
| Inte rnal Cos | | K Level | No. of. Questions | K – Level | No. of. Ques tions | K - Level | Section C Either or Choice | D Open Choice | | | |
| CI | CO1 | Up to K2 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | |
| AI | CO2 | Up to K3 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K3) | | | |
| CI | CO3 | Up to K3 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | |
| AII | CO4 | Up to K4 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K4) | | | |
| | | No. of Questions to be asked | 4 | | 3 | | 4 | 2 | | | |
| Pat | stion tern | No. of Questions to be answered | 4 | | 3 | | 2 | 1 | | | |
| CIA I & II | | Marks for each question | 1 | | 2 | | 5 | 10 | | | |
| | | Total Marks for each section | 4 | | 6 | | 10 | 10 | | | |

| | Distribution of Marks with K Level CIA I & CIA II | | | | | | | | | | |
|-----|---|--|---|---|-------------------------------|----------------|--------------------------------------|---------------------|--|--|--|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % | | | |
| | K1 | 2 | 2 | - | - | 4 | 8 | | | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 | | | |
| CIA | K3 | - | - | 10 | 10 | 20 | 40 | 40 | | | |
| I | K4 | - | - | - | - | - | - | - | | | |
| - | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 | | | |
| | K1 | 2 | 2 | - | - | 4 | 8 | | | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 | | | |
| CIA | K3 | - | - | 10 | - | 10 | 20 | 20 | | | |
| II | K4 | - | - | - | 10 | 10 | 20 | 20 | | | |
| | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 | | | |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| Summa | Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs) | | | | | | | | | |
|------------------------------|---|---------------|---------------------|--------------|------------------------|--------------|----------------------------|------------------|--|--|
| | | | MC | Qs | Short A | nswers | Section C | Section D | | |
| S. No | COs | K - Level | No. of Questions | K – Level | No. of Questio n | K – Level | (Either / or Choice) | (Open Choice) | | |
| 1 | CO1 | Up to K2 | 2 | K1,K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | |
| 2 | CO2 | Up to K3 | 2 | K1&K2 | 1 | K1 | 2 (K3&K3) | 1(K3) | | |
| 3 | CO3 | Up to K3 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K3) | | |
| 4 | CO4 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | | |
| 5 | CO5 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | | |
| No. of | Questions | to be Asked | 10 | | 5 | | 10 | 5 | | |
| No. of Q | uestions to | be answered | 10 | | 5 | | 5 | 3 | | |
| Marks for each question | | | 1 | | 2 | | 5 | 10 | | |
| Total Marks for each section | | | 10 | | 10 | | 25 | 30 | | |
| () | Figures i | n parenthesis | denotes, qu | estions sho | uld be ask | ed with t | he given K l | evel) | | |

| | Distribution of Marks with K Level | | | | | | | | | | |
|------------|--|---|-------------------------------------|-------------------------------|----------------|--------------------------------------|-------------------|--|--|--|--|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % | | | | |
| K1 | 5 | 4 | - | - | 9 | 7.5 | 33 | | | | |
| K2 | 5 | 6 | 10 | 10 | 31 | 25.83 | 55 | | | | |
| K3 | - | - | 40 | 20 | 60 | 50 | 50 | | | | |
| K4 | - | - | - | 20 | 20 | 16.67 | 17 | | | | |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 | | | | |
| NB: Hig | her level of p | erformance o | f the students | s is to be asse | essed by a | attempting | higher level | | | | |

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

| Section . | A (Mul | tiple Choic | e Questions) |
|----------------|------------|-------------|---|
| Answer | All Que | estions | (10x1=10 marks) |
| Q. No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| Section 1 | B (Shor | t Answers |) |
| Answer | All Que | estions | (5x2=10 marks) |
| Q. No | CO | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| Section | C (Eith | er/Or Typ | e) |
| Answer | All Que | estions | (5 x 5 = 25 marks) |
| Q. No | CO | K Level | Questions |
| 16) a | CO1 | K2 | |
| 16) b | CO1 | K2 | |
| 17) a | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K3 | |
| 19) b | CO4 | K3 | |
| 20) a | CO5 | K3 | |
| 20) b | CO5 | K3 | |
| | | | rmance of the students is to be assessed by attempting higher |
| level of l | | | |
| | · • | n Choice) | |
| | | ree questi | |
| Q. No | CO | K Level | Questions |
| 21 | C01 | K2 | |
| 22 | CO2 | K3 | |
| 23 | CO3 | K3 | |
| | | K4 | |
| 23 24 25 | CO4 CO5 | K4 K4 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | BIOINORGANIC CHEMISTRY | | | | | | |
|---|--|---------|------------|-------|--|--|--|
| Course Code | 21UCHE54 | L | Р | С | | | |
| Category | tegory CORE ELECTIVE | | | | | | |
| Nature of cours | e: EMPLOYABILITY 🗸 SKILL ORIENTED 🖌 ENTREPREN | URS | HIP | ✓ | | | |
| Course Objecti | ves: | | | | | | |
| • | the fundamentals of biomolecules and metals in biological systems an | d gen | eraliz | ze | | | |
| their structu | | | | | | | |
| | er the structures of myoglobin & hemoglobin, copper & nitrogen enz | | | | | | |
| - | the behavior of dioxygen bound to metals and role of metals in medi | cine | | | | | |
| | the structure of the active site in myoglobin & hemoglobin | | | | | | |
| | the metals containing proteins and enzymes and metal toxicity | | | | | | |
| | TALS IN BIOLOGY | | 15 | | | | |
| | Essential Chemical Elements – Metals in Biological Systems – Biolo | | | | | | |
| ÷ | - Electronic and Geometric Structures of Metals -Metals in Biolog | gical S | System | ms – | | | |
| | ng proteins and enzymes. | | 1.0 | | | | |
| | NDAMENTALS OF BIOMOLECULES | | 15 | | | | |
| | o Acid Building Blocks – Protein Structure – Protein Sequencing and | | | | | | |
| | otein Function, Enzymes, Classification of enzymes – Enzyme Kineti | cs – | | | | | |
| Enzyme Inhibiti | | | 1.7 | | | | |
| | OGLOBIN AND HEMOGLOBIN | | 15 | | | | |
| | Hemoglobin: Structure of the Prosthetic Group – Mechanism for Rev | | | | | | |
| | d Cooperativity of Oxygen Binding – Behavior of Dioxygen Bou | | | | | | |
| | e Active Site in Myoglobin and Hemoglobin – Binding of CO | to M | lyogi | obin, | | | |
| Hemoglobin. Unit: IV CO | PPER AND NITROGEN ENZYMES | | 15 | | | | |
| | s: Occurrence – Structure – Function – Discussion of Specific Enzyn | | - | | | | |
| | emocyanin. Enzyme Nitrogenase: Iron–Sulfur Clusters – Fe–Prot | | | | | | |
| Distilled Mecha | | | Iuciu | ne – | | | |
| | LE OF METALS IN MEDICINE | | 15 | | | | |
| | cinal Chemistry - Metal Toxicity and Homeostasis – Anti-cancer a | ante. | | | | | |
| _ | pounds - Chelation therapy – Cancer treatment – Anti-arthritis drug | - | _ | | | | |
| MRI Imaging A | · · · · · | 3 – U | auom | mum | | | |
| | Total Lecture Ho | urs | 75 H | rs | | | |
| Books for Stud | | uib | /// | 15 | | | |
| | • | | | | | | |
| | dy. K, Bioinorganic Chemistry, New Age International, 2003, New D | | ~ | | | | |
| 2. Malik. W.U, Tuli. G.D, Madan. R.D, Selected topics in Inorganic Chemistry, 7 th Edition, S. | | | | | | | |
| | 003, New Delhi. | | | | | | |
| Books for Refe | | • | T 1 | | | | |
| | Roat Malone, Bioinorganic Chemistry: A short course, Wiley – Interso | eience | , Johi | n | | | |
| Wiley & Sons, I | | n | | | | | |
| 2. Miessier. G. | L and Donald A. Tarr, Inorganic Chemistry, Pearson Publication, 200 | ۷. | | | | | |

3. James E. Huheey, Ellen Keiter and Richard Keiter, Inorganic Chemistry: Principles of Structure and Reactivity, Pearson Publication, 1993.

4. Lippard. S.T and Berg. T.M, Principles of Bioinorganic Chemistry, Panima Publishing Co., 1997, New York.

Web Resources:

- 1. https://youtu.be/pXztk04J7u0
- 2. https://youtu.be/eayeaUT5fus
- 3. https://youtu.be/6TVI_cjBeOs
- 4. <u>https://youtu.be/2Xq-x1c8PZg</u>

| | e Outcomes | K Level | | | | | | |
|-------------|--|------------|--|--|--|--|--|--|
| On th | On the completion of the course the student will be able to | | | | | | | |
| CO1: | Identify the fundamentals of biomolecules in biological systems and their structures | [Up to K2] | | | | | | |
| CO2: | Remember the structures of myoglobin & hemoglobin, copper & nitrogen enzymes. | [Up to K3] | | | | | | |
| CO3: | Compare the behavior of dioxygen bound to metals and role of metals in medicine | [Up to K3] | | | | | | |
| CO4: | Perform the structure of the active site in myoglobin & hemoglobin | [Up to K4] | | | | | | |
| CO5: | Determine the metals containing proteins and enzymes and metal toxicity | [Up to K4] | | | | | | |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | |
|-----------------|--------------------------|-------------|-------------|------|-------------|-------------|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | |
| CO5 | 1 | 3 | 2 | 3 | 2 | 1 | | |
| Weightage | 10 | 10 | 10 | 11 | 9 | 11 | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| Unit | Course Name | Hrs | Pedagogy |
|------|--|-----|------------------------------------|
| I | METALS IN BIOLOGYIntroduction – Essential Chemical Elements – Metals in BiologicalSystems – Biological Metal Ion Complexation – Electronic andGeometric Structures of Metals –Metals in Biological Systems – Metalscontaining proteins and enzymes. | 15 | Chalk, Talk & Power point |
| II | FUNDAMENTALS OF BIOMOLECULESProteins – Amino Acid Building Blocks – Protein Structure – ProteinSequencing and Proteomics – Protein Function, Enzymes, Classificationof enzymes – Enzyme Kinetics – Enzyme Inhibition. | 15 | Chalk, Talk & Power point |
| ш | MYOGLOBIN AND HEMOGLOBINMyoglobin and Hemoglobin: Structure of the Prosthetic Group –Mechanism for Reversible Binding of Dioxygen and Cooperativity ofOxygen Binding – Behavior of Dioxygen Bound to Metals – Structureof the Active Site in Myoglobin and Hemoglobin – Binding of CO toMyoglobin, Hemoglobin. | 15 | Chalk, Talk & Power point |
| IV | COPPER AND NITROGEN ENZYMES Copper Enzymes: Occurrence – Structure – Function – Discussion of Specific Enzymes: Superoxide Dismutase – Hemocyanin. Enzyme Nitrogenase: Iron–Sulfur Clusters – Fe–Protein Structure – Detailed Mechanistic Studies. | 15 | Chalk, Talk & Power point |
| v | ROLE OF METALS IN MEDICINEInorganic Medicinal Chemistry - Metal Toxicity and Homeostasis -Anti-cancer agents: Cisplatin and related compounds - Chelation therapy- Cancer treatment - Anti-arthritis drugs - Gadolinium MRI ImagingAgents. | 15 | Chalk, Talk & Power point |

Course Designed by: Dr. R. Satheesh & Dr. V. Ramasamy Raja

| | Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs) | | | | | | | | | | |
|--------------|--|---------------------------------------|----------------------------|------------------|-------------------------------------|-------------------------|----------------------------------|-----------------------|--|--|--|
| | | | Section | | | tion B | Section C | Sectio | | | |
| Inte rnal | Cos | K Level | MC No. of. Questions | XQS K – Level | Short A No. of. Questi ons | Answers K - Level | Section C Either or Choice | n D Open Choice | | | |
| CI | CO1 | Up to K2 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | |
| AI | CO2 | Up to K3 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K3) | | | |
| CI | CO3 | Up to K3 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | |
| AII | CO4 | Up to K4 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K4) | | | |
| | | No. of Questions to be asked | 4 | | 3 | | 4 | 2 | | | |
| Pat | estion tern I & II | No. of Questions to be answered | 4 | | 3 | | 2 | 1 | | | |
| | 1 & 11 | Marks for each question | 1 | | 2 | | 5 | 10 | | | |
| | | Total Marks for each section | 4 | | 6 | | 10 | 10 | | | |

| | Distribution of Marks with K Level CIA I & CIA II | | | | | | | | | | |
|-----|---|--|---|---|-------------------------------|----------------|--------------------------------------|---------------------|--|--|--|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % | | | |
| | K1 | 2 | 2 | - | - | 4 | 8 | | | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 | | | |
| CIA | K3 | - | - | 10 | 10 | 20 | 40 | 40 | | | |
| | K4 | - | - | - | - | - | - | - | | | |
| | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 | | | |
| | K1 | 2 | 2 | - | - | 4 | 8 | | | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 | | | |
| CIA | K3 | - | - | 10 | - | 10 | 20 | 20 | | | |
| II | K4 | - | - | - | 10 | 10 | 20 | 20 | | | |
| | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 | | | |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| S | Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs) | | | | | | | | | | |
|----------|---|---------------|---------------------|--------------|------------------------|--------------|----------------------------|-------------------------------|--|--|--|
| | | | MC | Qs | Short Answers | | Section C | Section D | | | |
| S. No | COs | K - Level | No. of Questions | K – Level | No. of Questio n | K – Level | (Either / or Choice) | Section D (Open Choice) | | | |
| 1 | CO1 | Up to K2 | 2 | K1,K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | |
| 2 | CO2 | Up to K3 | 2 | K1&K2 | 1 | K1 | 2 (K3&K3) | 1(K3) | | | |
| 3 | CO3 | Up to K3 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K3) | | | |
| 4 | CO4 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | | | |
| 5 | CO5 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | | | |
| No. of | Questions | s to be Asked | 10 | | 5 | | 10 | 5 | | | |
| No | No.of Questions to be answered | | 10 | | 5 | | 5 | 3 | | | |
| Ma | Marks for each question | | 1 | | 2 | | 5 | 10 | | | |
| Total | Marks for | each section | 10 | | 10 | | 25 | 30 | | | |
| | (Figures | in parenthesi | is denotes, qu | estions sh | ould be asl | ked with | the given K | level) | | | |

| | Distribution of Marks with K Level | | | | | | | | | |
|------------|--|---|-------------------------------------|-------------------------------|----------------|--------------------------------------|----------------|--|--|--|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % | | | |
| K1 | 5 | 4 | - | - | 9 | 7.5 | 33 | | | |
| K2 | 5 | 6 | 10 | 10 | 31 | 25.83 | 55 | | | |
| K3 | _ | - | 40 | 20 | 60 | 50 | 50 | | | |
| K4 | _ | - | - | 20 | 20 | 16.67 | 17 | | | |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 | | | |

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

| Section | A (Mu | ltiple Choi | ce Questions) |
|----------|----------|-------------|--|
| Answer | - | - | (10x1=10 marks) |
| Q. No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| Section | B (Sho | rt Answer | s) |
| Answer | All Qu | iestions | (5x2=10 marks) |
| Q. No | CO | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| Section | C (Eitl | her/Or Typ | pe) |
| Answer | · All Qu | iestions | (5 x 5 = 25 marks) |
| Q. No | CO | K Level | Questions |
| 16) a | CO1 | K2 | |
| 16) b | CO1 | K2 | |
| 17) a | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K3 | |
| 19) b | CO4 | K3 | |
| 20) a | CO5 | K3 | |
| 20) b | CO5 | K3 | |
| | | | ormance of the students is to be assessed by attempting higher |
| level of | | | |
| | | en Choice) | |
| | | hree quest | |
| Q. No | CO | K Level | Questions |
| 21 | CO1 | K2 | |
| 22 | CO2 | K3 | |
| 23 | CO3 | K3 | |
| 24 | CO4 | K4 | |
| 25 | CO5 | K4 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | CHEMISTRY IN CRIME INVESTIGATION | | | | | | | |
|---------------------------------------|---|--------|------------|--------------|--|--|--|--|
| Course Code | 21UCHE55 | L | Р | С | | | | |
| Category | CORE ELECTIVE | 5 | - | 5 | | | | |
| Nature of cours | e: EMPLOYABILITY 🗸 SKILL ORIENTED 🖌 ENTREPREN | NURS | HIP | \checkmark | | | | |
| Course Objecti | ives: | | | | | | | |
| | e concept of forensic science and criminology studies | | | | | | | |
| | ber the finger prints and classification and uses of finger prints | | | | | | | |
| - | To Compare the concepts of arsons, explosives and ballistics | | | | | | | |
| | the biological substances in the dead clinic symptom | | | | | | | |
| | the crime through network documents | | 1.5 | , | | | | |
| | IMINOLOGY AND FORENSIC SCIENCE | -1 | 15 | | | | | |
| | definition - nature and scope - types of crimes penology - Indian per | | | | | | | |
| crime investigat | ndian criminal procedure code. Forensic science – definition - princi | pies a | na us | es m | | | | |
| | IGER PRINTS & TRACKS-TRACES | | 15 | | | | | |
| | patterns – classification - uses of finger print in crime investigation - | direct | | | | | | |
| | ment by powders - other methods of development - transfer methods | | | | | | | |
| 1 1 | s - Foot prints - casting of foot prints - residue prints - walking patte | | U I | | | | | |
| | races & tracks - glass fracture - tool marks – paints – fibres. | | | | | | | |
| | DLOGICAL SUBSTANCES AND POISONS | | 15 | | | | | |
| Blood – semen | 1 – saliva – sweat – urine – hair – skin - DNA analysis. Poise | ons - | types | and | | | | |
| classification-di | agonosis of poisoning in the living and in the dead - clinical sympton | n - po | st-mc | rtem | | | | |
| appearances - tr | eatment in cases of poisoning - antidotes. | | | | | | | |
| | SONS, EXPLOSIVES AND BALLISTICS | | 15 | | | | | |
| | d arson - nature of action of fire - drifts and air supply - burning | | | | | | | |
| | lefinition - classification - compostion and mechanism of expl | | | | | | | |
| | sification - internal, external and terminal ballistics - small arms -c | | | | | | | |
| | - laboratory examination of barrel washing and detection of pow | der re | sidue | s by | | | | |
| chemical tests. | | | 1.5 | , | | | | |
| | BER CRIMES AND DOCUMENTS | •,• | 15 | | | | | |
| · · · · · · · · · · · · · · · · · · · | crime through network Documents - Chemistry of paper and ink - | | U I | • | | | | |
| | chalk – adhesives - sealing waxes - different types of forged signat geries -inherent signs of forgery models - writing of forged m | | | | | | | |
| | dified - use of ultraviolet rays - comparison of type written letters | | | _ | | | | |
| currency and co | • | - cou | mern | | | | | |
| | Total Lecture He | ours | 75 H | rs | | | | |
| Books for Stud | | | | | | | | |
| 1. Saferstein, R | , Criminalities and introduction to Forensic Science, Prentice Hall of | India | .1978 | | | | | |
| Books for Refe | rences: | | | | | | | |
| 1. James, T.H., | Forensic Science.1987 | | | | | | | |
| Web Resources | | | | | | | | |
| | | | | | | | | |

| | 1. <u>https://youtu.be/Wtwx_uOgOUc</u> 2. <u>https://youtu.be/StcLHDM3Vng</u> | | | | | |
|-------------|--|------------|--|--|--|--|
| Course | Course Outcomes K Level | | | | | |
| On th | e completion of the course the student will be able to | | | | | |
| CO1: | Ability to understand the concept of forensic science | [Up to K2] | | | | |
| CO2: | Discuss the criminological studies through finger prints | [Up to K3] | | | | |
| CO3: | Interpret the classification of finger print and biological substances | [Up to K3] | | | | |
| CO4: | Examine the relationship between arsons, explosives and ballistics | [Up to K4] | | | | |
| CO5: | Analyze the cyber crime through network documents | [Up to K4] | | | | |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | |
|------------------------|--------------------------|-------------|-------------|------|------|-------------|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | |
| CO5 | 1 | 3 | 2 | 3 | 2 | 1 | | |
| Weightage | 10 | 10 | 10 | 11 | 9 | 11 | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| Unit | Course Name | Hrs | Pedagogy |
|------|---|-----|------------------------------------|
| Ι | CRIMINOLOGY AND FORENSIC SCIENCE Criminology – definition - nature and scope - types of crimes penology - Indian penal code - Indian evidence act - Indian criminal procedure code. Forensic science – definition - principles and uses in crime investigation. | 15 | Chalk, Talk & Power point |
| II | FINGER PRINTS & TRACKS – TRACES Finger prints – patterns – classification - uses of finger print in crime investigation - direct and latent prints - development by powders - other methods of development - transfer methods of finger prints. Tracks – Traces - Foot prints - casting of foot prints - residue prints - walking pattern - tire marks - miscellaneous traces & tracks - glass fracture - tool marks – paints – fibres. | 15 | Chalk, Talk & Power point |
| III | BIOLOGICAL SUBSTANCES AND POISONS | 15 | Chalk, Talk & |

| | Blood – semen – saliva – sweat – urine – hair – skin - DNA analysis. Poisons - types and classification-diagonosis of poisoning in the living and in the dead - clinical symptom - post-mortem appearances - treatment in cases of poisoning - antidotes. | | Power point |
|----|---|----|------------------------------------|
| IV | ARSONS, EXPLOSIVES AND BALLISTICS Natural fires and arson - nature of action of fire - drifts and air supply - burning characteristics. Explosives – definition – classification - compostion and mechanism of explosion - bombs. Ballistics – classification - internal, external and terminal ballistics - small arms - classification and characteristics - laboratory examination of barrel washing and detection of powder residues by chemical tests. | 15 | Chalk, Talk & Power point |
| v | CYBER CRIMES AND DOCUMENTS Cyber crimes - crime through network Documents - Chemistry of paper and ink - writing paper - carbon paper – chalk – adhesives - sealing waxes - different types of forged signatures - simulated and traced forgeries -inherent signs of forgery models - writing of forged models - writing deliberately modified - use of ultraviolet rays - comparison of type written letters - counterfeit of currency and coins. | 15 | Chalk, Talk & Power point |

Course Designed by: Dr. K. Muthupandi & Dr. R. Satheesh

| | | | g Outcome B Formative Ex Aapping – K | kamination - | Blue Pri | nt | | |
|--------------|--------------------------|---------------------------------------|--|--------------|--------------------------|----------------------|---------------------|--------------------|
| | | | Secti | | | tion B | Section C | Secti on D |
| Inte rnal | Cos | K Level | MC No. of. Questions | K – Level | No. of. Questi ons | Answers K - Level | Either or Choice | Open Choi ce |
| CI | CO1 | Up to K2 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) |
| AI | CO2 | Up to K3 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K3) |
| CI | CO3 | Up to K3 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) |
| AII | CO4 | Up to K4 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K4) |
| | | No. of Questions to be asked | 4 | | 3 | | 4 | 2 |
| Pat | estion tern I & II | No. of Questions to be answered | 4 | | 3 | | 2 | 1 |
| | 1 & 11 | Marks for each question | 1 | | 2 | | 5 | 10 |
| | | Total Marks for each section | 4 | | 6 | | 10 | 10 |

| | Distribution of Marks with K Level CIA I & CIA II | | | | | | | | | | |
|-----|---|--|---|---|-------------------------------|----------------|--------------------------------------|---------------------|--|--|--|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % | | | |
| | K1 | 2 | 2 | - | - | 4 | 8 | | | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 | | | |
| CIA | K3 | - | - | 10 | 10 | 20 | 40 | 40 | | | |
| | K4 | - | - | - | - | - | - | - | | | |
| - | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 | | | |
| | K1 | 2 | 2 | - | - | 4 | 8 | | | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 | | | |
| CIA | K3 | - | - | 10 | - | 10 | 20 | 20 | | | |
| II | K4 | - | - | - | 10 | 10 | 20 | 20 | | | |
| | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 | | | |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| S | Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs) | | | | | | | | | | |
|------------------------------|---|-------------------|---------------------|--------------|------------------------|--------------|----------------------------|-------------------------------|--|--|--|
| | | | MCC | `` | Short Answers | | Section C | Seather D | | | |
| S. No | COs | K - Level | No. of Questions | K – Level | No. of Questio n | K – Level | (Either / or Choice) | Section D (Open Choice) | | | |
| 1 | CO1 | Up to K2 | 2 | K1,K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | |
| 2 | CO2 | Up to K3 | 2 | K1&K2 | 1 | K1 | 2 (K3&K3) | 1(K3) | | | |
| 3 | CO3 | Up to K3 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K3) | | | |
| 4 | CO4 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | | | |
| 5 | CO5 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | | | |
| No. of | Questions | s to be Asked | 10 | | 5 | | 10 | 5 | | | |
| No | o. of Quest answe | ions to be red | 10 | | 5 | | 5 | 3 | | | |
| Ma | Marks for each question | | 1 | | 2 | | 5 | 10 | | | |
| Total Marks for each section | | 10 | | 10 | | 25 | 30 | | | | |
| | (Figures | in parenthesi | is denotes, qu | estions sh | nould be as | ked with | the given K | level) | | | |

| | Distribution of Marks with K Level | | | | | | | | | | | |
|------------|--|---|-------------------------------------|-------------------------------|----------------|--------------------------------------|----------------|--|--|--|--|--|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % | | | | | |
| K1 | 5 | 4 | - | - | 9 | 7.5 | 33 | | | | | |
| K2 | 5 | 6 | 10 | 10 | 31 | 25.83 | 55 | | | | | |
| K3 | - | - | 40 | 20 | 60 | 50 | 50 | | | | | |
| K4 | _ | - | - | 20 | 20 | 16.67 | 17 | | | | | |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 | | | | | |

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

| | - | - | e Questions) |
|------------|----------|--------------|---|
| Answer | | | (10x1=10 marks) |
| Q. No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| | | t Answers |) |
| Answer | - | 1 | (5x2=10 marks) |
| Q. No | CO | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| Section | C (Eith | er/Or Type | e) |
| Answer | All Que | estions | (5 x 5 = 25 marks) |
| Q. No | CO | K Level | Questions |
| 16) a | CO1 | K2 | |
| 16) b | CO1 | K2 | |
| 17) a | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K3 | |
| 19) b | CO4 | K3 | |
| 20) a | CO5 | K3 | |
| 20) b | CO5 | K3 | |
| NB: Hig | her lev | el of perfoi | rmance of the students is to be assessed by attempting higher |
| level of I | K levels | - | |
| Section 1 | D (Ope | n Choice) | |
| Answer | Any Th | ree questi | ons (3x10=30 marks) |
| Q. No | CO | K Level | Questions |
| 21 | CO1 | K2 | |
| 22 | CO2 | K3 | |
| | CO3 | K3 | |
| 23 | COS | | |
| 23 24 | CO3 | K4 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name FOOD PROCESSING CHEMISTRY | | | | | | | | |
|--|----------|-------|--------|--|--|--|--|--|
| Course Code 21UCHE56 | L | Р | С | | | | | |
| Category CORE ELECTIVE | 5 | - | 5 | | | | | |
| Nature of course: EMPLOYABILITY & SKILL ORIENTED & ENTREPREN | URSI | HIP | ✓ | | | | | |
| Course Objectives: | | | | | | | | |
| To Recall the raw materials in food processing and its properties | | | | | | | | |
| • To Remember the properties and deterioration reaction in fruits and vegetables | | | | | | | | |
| To Compare small scale food processing and nutritional changes | | | | | | | | |
| • To Perform the chemistry of sweeteners, legal aspects of food adulteration | | | | | | | | |
| To Determine the adulterants in food processing | | | | | | | | |
| Unit: I INTRODUCTION TO FOOD PROCESSING | | 15 | | | | | | |
| Introduction- importance of raw materials in food processing-properties of raw | | | | | | | | |
| material cleaning and classifications: dry and wet cleaning, peeling, sorting, gr | | | | | | | | |
| seeding, chilling and freezing- elements of food processing: food safety, food qual | | | | | | | | |
| foods - unit operation - unit processing - common unit process: pasteurization, steriliz | ation, | dryi | ng, | | | | | |
| separation, evaporation, refrigeration, freezing. | | | | | | | | |
| Unit: II FRUITS AND VEGETABLES PROCESSING | | 15 | | | | | | |
| Introduction - properties of fruits and vegetables - Deterioration reactions in fruits | | - | | | | | | |
| changes in enzymes, chemical changes, nutritional quality changes, physical chan | iges, 1 | biolo | gical | | | | | |
| changes - raw materials for fruits and vegetables processing. | | | | | | | | |
| Unit: III SMALL-SCALE FOOD PROCESSING | | 15 | | | | | | |
| Processing of cereal and pulses- grain processing: puffing, flaking, milling, doug | | | | | | | | |
| extrusion, baking, frying, porridge-baked products- snack foods processing- r | nanuf | actur | e of | | | | | |
| beverages- coffee processing. | | | | | | | | |
| Unit: IV FOOD ADDITIVES | | 15 | | | | | | |
| Introduction-chemistry of sweeteners: intense sweetuieners, bulk sweeteners - food of | | | | | | | | |
| colours, synthetic colours - permitted levels of colourants - list of permitted colourant | | | | | | | | |
| agents-antioxidants: chemistry of antioxidants, type of antioxidants and uses: | | | - | | | | | |
| tocoperols, butylated hydroxyanisole (BHA), citric acid, Beta-carotene, lutein - | | | | | | | | |
| foodstuff containing emulisifiers - types of emulsions - acidulants: acetic acid, citric a | icid, la | actic | acid, | | | | | |
| malic acid, phoaphoric acid, tartaric acid. | | 1.5 | | | | | | |
| Unit: V FOOD ADULTERATION | 1 . 1. | 15 | | | | | | |
| Introduction - Legal Aspects of food adulteration and prevention - common foo | | | | | | | | |
| analysis of various food adulterants: analysis of adulterants in edible oils, ghee, coffe | - | | | | | | | |
| powder, turmeric powder, meat and milk - harmful effect of the adulterants. Food Pr | | | | | | | | |
| and wheat products- classification of wheat - wheat flour - wheat products - milk and composition of milk - milk grades - some commercial milk products. | ШК | produ | icts - | | | | | |
| Total Lecture Hor | irc | 75 H | rc | | | | | |
| Books for Study: | 413 | 15 11 | 13 | | | | | |
| | - | _ | | | | | | |
| 1. Vikas Ahlluwalia, A text book of Food Processing Paragon International Publisher | s, Nev | v Del | hi, | | | | | |
| 2007. | | | | | | | | |

| 2. A te | xt book of Food Chemistry, Alex V Ramani, MJP Publications, Chennai, 2009 |). |
|-------------|---|------------------|
| Books | for References: | |
| 1. P.J. | Fellows, Food Processing Technology. Principles and Practices, Second Edi | tion, Woodland |
| Pub | lishing Ltd, Cambridge, England, 2002. | |
| 2. Ava | ntina Sharma, Text Book of Food Science and Technology, International Bo | ok, Distributing |
| Co, | Lucknow, UP, 2006. | _ |
| 3. Siva | sankar, Food Processing and Preservation, Prentice Hall of India Pvt. Ltd., | New Delhi. 3rd |
| Prin | ting, 2005. | |
| 4. Pete | er Zeuthen and Leif Bogh-Sorenson, Food Preservation Techniques, Wood | land Publishing |
| Ltd. | , Cambridge, England, 200 | |
| Web R | lesources: | |
| | tps://youtu.be/naauUbo4Ick | |
| | tps://youtu.be/WRYoGiOobqU | |
| | tps://youtu.be/AMJYn3hgv3o | |
| | tps://youtu.be/a4aKLHCLyD8 | |
| - | e Outcomes | K Level |
| On th | e completion of the course the student will be able to | |
| CO1: | Ability to understand the raw materials in food processing | [Up to K2] |
| CO2: | Discuss the various elements of food processing and properties fruits and | [Up to K3] |
| 02. | vegetables | |
| CO3: | Interpret the study of small-scale food processing | [Up to K3] |
| CO4: | Examine the legal aspects of food adulteration and prevention | [Up to K4] |
| CO5: | Analyze the food additives, food adulterants in food processing | [Up to K4] |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | | |
|------------------------|--------------------------|-------------|-------------|------|------|------|--|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | | |
| CO5 | 1 | 3 | 2 | 3 | 2 | 1 | | | |
| Weightage | 10 | 10 | 10 | 11 | 9 | 11 | | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| Unit | Course Name | Hrs | Pedagogy |
|------|--|-----|------------------------------------|
| Ι | INTRODUCTION TO FOOD PROCESSING Introduction- importance of raw materials in food processing-properties of raw material-raw material cleaning and classifications: dry and wet cleaning, peeling, sorting, grading, cutting, seeding, chilling and freezing- elements of food processing: food safety, food quality, convenient foods - unit operation - unit processing - common unit process: pasteurization, sterilization, drying, separation, evaporation, refrigeration, freezing. | 15 | Chalk, Talk & Power point |
| II | FRUITS AND VEGETABLES PROCESSING Introduction - properties of fruits and vegetables - Deterioration reactions in fruits and vegetable: changes in enzymes, chemical changes, nutritional quality changes, physical changes, biological changes - raw materials for fruits and vegetables processing. | 15 | Chalk, Talk & Power point |
| III | SMALL-SCALE FOOD PROCESSING Processing of cereal and pulses- grain processing: puffing, flaking, milling, doughs and batters, extrusion, baking, frying, porridge-baked products- snack foods processing- manufacture of beverages- coffee processing. | 15 | Chalk, Talk & Power point |
| IV | FOOD ADDITIVES Introduction-chemistry of sweeteners: intense sweetuieners, bulk sweeteners - food colours: natural colours, synthetic colours - permitted levels of colourants - list of permitted colourants - flavouring agents- antioxidants: chemistry of antioxidants, type of antioxidants and uses: ascorbic acid, tocoperols, butylated hydroxyanisole (BHA), citric acid, Beta-carotene, lutein - emulisifiers - foodstuff containing emulisifiers - types of emulsions - acidulants: acetic acid, citric acid, lactic acid, malic acid, phoaphoric acid, tartaric acid. | 15 | Chalk, Talk & Power point |
| V | FOOD ADULTERATION Introduction - Legal Aspects of food adulteration and prevention - common food adulterants - analysis of various food adulterants: analysis of adulterants in edible oils, ghee, coffee powder, chili powder, turmeric | 15 | Chalk, Talk & Power point |

| powder, meat and milk - harmful effect of the adulterants. Food | |
|---|--|
| Products: Wheat and wheat products- classification of wheat - wheat | |
| flour - wheat products - milk and milk products - composition of milk - | |
| milk grades - some commercial milk products. | |

Course Designed by: Dr. V. Ramasamy Raja & Dr. K. Muthupandi

| | Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs) | | | | | | | | | | |
|------------------|--|---------------------------------|-------------------------------|------------------|---------------------------------|------------------------|----------------------------------|-----------------------------|--|--|--|
| | | | Section A | | Section B | | | | | | |
| Inte rnal Cos | | K Level | M No. of. Questio ns | CQs K – Level | Short A No. of. Questions | nswers K - Level | Section C Either or Choice | Section D Open Choice | | | |
| CI | CO1 | Up to K2 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | |
| AI | CO2 | Up to K3 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K3) | | | |
| CI | CO3 | Up to K3 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | |
| AII | CO4 | Up to K4 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K4) | | | |
| | | No. of Questions to be asked | 4 | | 3 | | 4 | 2 | | | |
| Pat | estion tern | No. of Questions to be answered | 4 | | 3 | | 2 | 1 | | | |
| CIA | I & II | Marks for each question | 1 | | 2 | | 5 | 10 | | | |
| | | Total Marks for each section | 4 | | 6 | | 10 | 10 | | | |

| | Distribution of Marks with K Level CIA I & CIA II | | | | | | | | | | | |
|-----|---|---|---|---|-------------------------------|----------------|--------------------------------------|---------------------|--|--|--|--|
| | K (Multiple Level Choice Questions) | | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % | | | | |
| | K1 | 2 | 2 | - | - | 4 | 8 | | | | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 | | | | |
| CIA | K3 | - | - | 10 | 10 | 20 | 40 | 40 | | | | |
| I | K4 | - | - | - | - | - | - | - | | | | |
| - | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 | | | | |
| | K1 | 2 | 2 | - | - | 4 | 8 | | | | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 | | | | |
| CIA | K3 | - | - | 10 | - | 10 | 20 | 20 | | | | |
| II | K4 | - | - | - | 10 | 10 | 20 | 20 | | | | |
| | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 | | | | |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| S | Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs) | | | | | | | | | | |
|--------------------------------|---|---------------|---------------------|--------------|------------------------|--------------|----------------------------|-------------------------------|--|--|--|
| | | | MC | Qs | Short A | nswers | Section C | Section D | | | |
| S.No | COs | K - Level | No. of Questions | K – Level | No. of Questio n | K – Level | (Either / or Choice) | Section D (Open Choice) | | | |
| 1 | CO1 | Up to K2 | 2 | K1,K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | |
| 2 | CO2 | Up to K3 | 2 | K1&K2 | 1 | K1 | 2 (K3&K3) | 1(K3) | | | |
| 3 | CO3 | Up to K3 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K3) | | | |
| 4 | CO4 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | | | |
| 5 | CO5 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | | | |
| No. of | Questions | s to be Asked | 10 | | 5 | | 10 | 5 | | | |
| No.of Questions to be answered | | | 10 | | 5 | | 5 | 3 | | | |
| Mai | Marks for each question | | 1 | | 2 | | 5 | 10 | | | |
| Total | Marks for | each section | 10 | | 10 | | 25 | 30 | | | |
| | (Figures | in parenthesi | is denotes, qu | estions sh | ould be asl | ked with | the given K | level) | | | |

| | Distribution of Marks with K Level | | | | | | | | | | | |
|------------|---|---|-------------------------------------|-------------------------------|----------------|--------------------------------------|----------------|--|--|--|--|--|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % | | | | | |
| K1 | 5 | 4 | - | - | 9 | 7.5 | 33 | | | | | |
| K2 | 5 | 6 | 10 | 10 | 31 | 25.83 | | | | | | |
| K3 | - | - | 40 | 20 | 60 | 50 | 50 | | | | | |
| K4 | - | - | - | 20 | 20 | 16.67 | 17 | | | | | |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 | | | | | |
| - | NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels. | | | | | | | | | | | |

| Section | A (Mu | iltiple Cho | ice Questions) |
|----------|---------|-------------|--|
| Answei | r All Q | uestions | (10x1=10 marks) |
| Q.No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| Section | B (Sho | ort Answei | rs) |
| Answe | r All Q | uestions | (5x2=10 marks) |
| Q.No | CO | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| Section | C (Eit | her/Or Ty | pe) |
| Answei | r All Q | uestions | (5 x 5 = 25 marks) |
| Q.No | CO | K Level | Questions |
| 16) a | CO1 | K2 | |
| 16) b | CO1 | K2 | |
| 17) a | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K3 | |
| 19) b | CO4 | K3 | |
| 20) a | CO5 | K3 | |
| 20) b | CO5 | K3 | |
| | | | ormance of the students is to be assessed by attempting higher |
| level of | | | |
| | | en Choice | |
| | | Three ques | |
| Q.No | CO | K Level | Questions |
| 21 | CO1 | K2 | |
| 22 | CO2 | K3 | |
| 23 | CO3 | K3 | |
| 24 | CO4 | K4 | |
| 25 | CO5 | K4 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | DRUG CHEMISTRY | | | | | | | |
|--|---|---------|-------------|-------|--|--|--|--|
| Course Code | 21UCHS51 | L | Р | С | | | | |
| Category | SKILL | 2 | - | 2 | | | | |
| Nature of cours | e: EMPLOYABILITY 🗸 SKILL ORIENTED 🖌 ENTREPREN | URS | HIP | ✓ | | | | |
| Course Object | ives: | | | | | | | |
| | the different systems of medicines and its drug actions | | | | | | | |
| To Rememb | per the basic of anaesthetics and chemotherapy | | | | | | | |
| • To Interpret the therapeutic function of synthetic drugs | | | | | | | | |
| • To Understa | and about the antibiotics and indole derivatives | | | | | | | |
| | ne the various synthetic drugs, gaseous anaesthetics, chemotherapy ar | | ises | | | | | |
| | FRODUCTION TO THE DIFFERENT SYSTEMS OF MEDICIN | | 06 | | | | | |
| | ms of medicine: Ayurveda, Siddha, Homeopathy and Allopathy | | | | | | | |
| | istry – discovery of drugs – Introduction. Analgesics and Antipyre | | | | | | | |
| | forphine and derivatives. Total synthetic analgesics pethidine a | | | | | | | |
| | gesics – salicylic acid derivatives, Indole derivatives and p-amino ph | | | | | | | |
| | and structure only). Antibiotics – Definition, Penicillin – Tetracycl | ine (A | uron | iycin | | | | |
| • | -Streptomycin and Chloromycetin – drug action and uses. | | | | | | | |
| | AESTHETICS | C1 1 | 06 | | | | | |
| | thetics – Vinyl ether – Cyclopropane – Halo hydrocarbons – | | | | | | | |
| | ichloro ethylene – Intravenous anaesthetics – Thiopentone – Loca | i anae | stnet | 1CS – | | | | |
| | derivatives. (Therapeutic use only) TIBIOTICS AND ANTIMALARIALS | | 06 | | | | | |
| | Sulphadiazine, prontosil and prontosil-S. Antimalarials – quinine and | ite d | | | | | | |
| | – Salvarsan – 606 – Neosalvarsan. | i its u | criva | 1005. | | | | |
| | NTHETIC DRUGS | | 06 | | | | | |
| | and its therapeutic function of paracetamol – Aspirin – naproxen | – An | | | | | | |
| ciprofloxacin – | | 1 111 | lionyi | | | | | |
| • | stry and submission of Report. For industrial visit / Assignment = 5 | mark | s inte | rnal) | | | | |
| | Industrial Centre (DIC for visits) | | | | | | | |
| | DRMONES AND VITAMINS | | 06 | | | | | |
| | Classification Testosterone, Progesterone, Thyroxine, Vitamin C, | Struc | ture | only | | | | |
| | idation not necessary) | | | - 5 | | | | |
| | Total Lecture Ho | ours | 30 H | rs | | | | |
| Books for Stud | y: | ľ | | | | | | |
| 1. Jayashree G | hosh, A Textbook of Pharmaceutical Chemistry, S. Chand & Co., 199 | 99, Ne | w De | lhi. | | | | |
| Books for Refe | rences: | | | | | | | |
| | Craig and Robert E. Stitzel, Modern Pharmacology, 3 rd Edition, Little | Brow | n and | Со., | | | | |
| Boston, 1990. | | | | , | | | | |
| | sch, Peter G. Sammer, John B. Taylor and Peter D.K. Kennewell, | Comp | rehei | nsive | | | | |
| | nistry, Pergmon Press, Great Britain, 1990. | - | | | | | | |
| 3. Bertram G. | Katzung, Basic and Clinical Pharmocology, Lange Medical Publication | ons, A | tos, 1 | 982, | | | | |
| | | | | | | | | |

| Califor | nia. | |
|----------------|---|-------------|
| Web R | lesources: | |
| 1. <u>http</u> | s://youtu.be/IUxkcEoGkVg | |
| 2. <u>http</u> | <u>s://youtu.be/pss_sm2zaek</u> | |
| | <u>s://youtu.be/Z63xnlDNajE</u> | |
| 4. <u>http</u> | <u>s://youtu.be/qaYBUz14B3w</u> | |
| Course | e Outcomes | K Level |
| On th | e completion of the course the student will be able to | |
| CO1: | Ability to know the basic of anaesthetics and chemotherapy | [Up to K2] |
| CO2: | Discuss various synthetic drugs, gaseous anaesthetics, chemotherapy and its | IIIm to V21 |
| CO2: | uses | [Up to K3] |
| CO3: | Interpret the different systems of medicines and its drug actions | [Up to K3] |
| CO4: | Examine the antibiotics and indole derivatives | [Up to K4] |
| CO5: | Analyze the therapeutic function of synthetic drugs | [Up to K4] |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | |
|-----------------|--------------------------|-------------|-------------|------|-------------|------|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | |
| CO5 | 1 | 3 | 2 | 3 | 2 | 1 | | |
| Weightage | 10 | 10 | 10 | 11 | 9 | 11 | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| Unit | Course Name | Hrs | Pedagogy |
|------|--|-----|------------------------------------|
| Ι | INTRODUCTION TO THE DIFFERENT SYSTEMS OF MEDICINE Different systems of medicine: Ayurveda, Siddha, Homeopathy and Allopathy – History of medicinal chemistry – discovery of drugs – Introduction. Analgesics and Antipyretics – Narcotic analgesics – Morphine and derivatives. Total synthetic analgesics pethidine and methadone. Antipyretic analgesics – salicylic acid derivatives, Indole derivatives and p-amino phenol derivatives (Medicinal uses and structure only). Antibiotics – Definition, Penicillin – Tetracycline (Auromycin & Terramycin) –Streptomycin and Chloromycetin – drug action and uses. | 06 | Chalk, Talk & Power point |
| II | ANAESTHETICS Gaseous anaesthetics – Vinyl ether – Cyclopropane – Halo hydrocarbons – Chloroform – Haloethane– Trichloro ethylene – Intravenous anaesthetics – Thiopentone – Local anaesthetics – Cocaine and its derivatives. (Therapeutic use only) | 06 | Chalk, Talk & Power point |
| III | ANTIBIOTICS AND ANTIMALARIALS Sulpha drugs – Sulphadiazine, prontosil and prontosil-S. Antimalarials – quinine and its derivatives. Arsenical drugs – Salvarsan – 606 – Neosalvarsan. | 06 | Chalk, Talk & Power point |
| IV | SYNTHETIC DRUGSSynthetic drugs and its therapeutic function of paracetamol – Aspirin –naproxen – Amoxyllin – ciprofloxacin – Ibuprofen.Visit to an Industry and submission of Report. For industrial visit /Assignment = 5 marks internal) Contact District Industrial Centre (DIC for visits) | 06 | Chalk, Talk & Power point |
| V | HORMONES AND VITAMINSDefinition and Classification Testosterone, Progesterone, Thyroxine,Vitamin C, Structure only (Structural elucidation not necessary) | 06 | Chalk, Talk & Power point |

Course Designed by: Dr. R. Satheesh & Dr. A.J. Sunija





MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name PHYSICAL CHEMISTRY – III | ame PHYSICAL CHEMISTRY – III | | | | | | | | | |
|--|------------------------------|----------|-------|--|--|--|--|--|--|--|
| Course Code 21UCHC61 | L | Р | С | | | | | | | |
| Category Core | 6 | - | 6 | | | | | | | |
| Nature of course: EMPLOYABILITY ✓ SKILL ORIENTED ENTREPREN | URS | HIP | ✓ | | | | | | | |
| Course Objectives: | | | | | | | | | | |
| • To Recall the general characteristics of aromatic compounds and reaction mechanisms. | | | | | | | | | | |
| • To Remember the basics of aromatic compounds and polynuclear compounds. | | | | | | | | | | |
| • To Compare the preparation, properties of ortho, para, meta directing and aromatic | c com | pour | ıds. | | | | | | | |
| • To Perform the mechanism of reactions and effects of substituents. | | | | | | | | | | |
| • To Determine the various concepts on mechanisms and polynuclear compounds. | | | | | | | | | | |
| Unit: I THERMODYNAMICS – I | | 18 | | | | | | | | |
| Definition of thermodynamic terms: system, surroundings - types of systems, | inter | isive | and | | | | | | | |
| extensive properties - State and path functions and their differentials - Th | iermo | odyna | amic | | | | | | | |
| process - Concept of heat and work - Definition of internal energy and e | | | | | | | | | | |
| capacity - Heat capacities at constant volume and pressure and their relation | - | | | | | | | | | |
| Thomson effect – Joule-Thomson coefficient and inversion temperature – Calcu | | | | | | | | | | |
| dU & dH for the expansion of ideal gases under isothermal and adiabatic | condi | tions | s for | | | | | | | |
| reversible process – Hess's Law of constant heat summation and its applications | | | | | | | | | | |
| Unit: II THERMODYNAMICS - II | | 18 | | | | | | | | |
| Need for the second law-different statements of the second law-Carnot cycle a | | | | | | | | | | |
| Entropy as state function – entropy as a function of pressure and volume – Entro | | <u> </u> | | | | | | | | |
| an ideal gas – physical significances of entropy – Clausius inequality – entropy | | | | | | | | | | |
| spontaneity and equilibrium. Gibbs function (G) and Helmholts fund | | | | | | | | | | |
| thermodynamics quantities – Gibbs-Helmholts equation. Clausius Clapeyn | ron (| equa | tion- | | | | | | | |
| Application of Clausius- Clapeyron equation – Limitations of second law.Unit: IIIPHOTOCHEMISTRY | | 18 | | | | | | | | |
| Definition of photochemical reactions – comparative study of thermal and | nhoto | _ | | | | | | | | |
| reactions – laws of photochemistry – Lambert and Beer Law – Grothus – Draper | - | | | | | | | | | |
| Einstein law – quantum efficiency and its determination – Jablonski diagram – | | | | | | | | | | |
| processes – fluorescence phosphorescene and other deactivating processes. | | | | | | | | | | |
| processes – kinetics of photochemical reactions (H ₂ /Br ₂ reaction) – Photochemic | | | | | | | | | | |
| (Dimerisation of anthracene)– flash photolysis – photosensitization- chemilu | - | | | | | | | | | |
| bioluminescence. | | been | ~~ | | | | | | | |
| Unit: IV ELECTROCHEMISTRY – I | | 18 | | | | | | | | |
| Conductance-definition and determination of Specific conductance, equivalent conductance | | | | | | | | | | |
| and molar conductance – variation of equivalent conductance with dilution – Mi | | | | | | | | | | |
| - Kohlrausch's law – Arrhenius theory of electrolyte dissociation and its limitations - Ostwald's | | | | | | | | | | |
| dilution law - Debye Huckel-Onsagar's equation for strong electrolytes (element | tary t | reati | nent | | | | | | | |
| only) – Definition of transport number – determination by Hittorfs method – | | | | | | | | | | |
| conductivity measurements- determination of solubility products of sparingly so | luble | salts | and | | | | | | | |
| conductometric titrations – HCl Vs NaOH, CH ₃ COOH Vs NaOH. | | | | | | | | | | |
| Unit: V ELECTROCHEMISTRY – II | | 18 | | | | | | | | |

a) Single electrode potential, sign convention, Reversible and irreversible cells, conditions for a cell to be a reversible and irreversible – Nernst Equation – measurement of Emf (Poggendorff's method) types of electrodes – reference electrode (SHE, Calomel electrode, Ag-AgCl electrode) Potentiometric titrations – HCl Vs NaOH and K₂Cr₂O₇ Vs FeSO₄. b) Commercial cells: Primary and secondary batteries – dry cell – lead storage cell – fuel cell – Hvdrogen-Oxygen fuel cell

Total Lecture Hours90 Hrs

Books for Study:

2. B.R. Puri, L.R. Sharma and S. Pathania, Principles of Physical Chemistry, 47th Edition, Shoban Lal Nagin Chand & Co., 2017.

Books for References:

6. Gilbert W. Castellan, Physical Chemistry, 3rd Edition, Narosa Publishing House, 1985.

7. S. Glasstone, Textbook of Physical Chemistry, McMillan and Co., London, 1974.

8. P.L. Soni and Dharmarha, Textbook of Physical Chemistry, S. Chand & Co., New Delhi, 1991.

9. Arun Bahl, B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry, S. Chand & Co., New Delhi, 2014.

10. S.K. Dogra and S. Dogra, Physical Chemistry through Problems, 4th Edition, New Age International, New Delhi 1996.

Web Resources:

- 1. https://youtu.be/hEZeQ_HSnOU
- 2. <u>https://youtu.be/fHfv41HmIK0</u>
- 3. <u>https://youtu.be/BECSYfYhJGk</u>
- 4. https://youtu.be/fM8hwkW8bIw
- 5. https://youtu.be/tJj-ilJTo6Y
- 6. https://youtu.be/uHoKGy704jk
- 7. https://youtu.be/4swtYzEbl64
- 8. https://youtu.be/q9c3-8CE_ro

Course Outcomes

| On th | On the completion of the course the student will be able to | | | | | |
|-------------|---|------------|--|--|--|--|
| CO1: | To acquire elaborate the basic knowledge in thermodynamics. | [Up to K2] | | | | |
| CO2: | To get more knowledge second law of thermodynamics, entropy. | [Up to K3] | | | | |
| CO3: | To learn about the photochemical reactions and photochemical processes. | [Up to K3] | | | | |
| CO4: | To determine the concept of conductance and conductometric titrations. | [Up to K4] | | | | |
| CO5: | To analysis the basic knowledge in electrodes, electrode potentials and potentiometric titrations | [Up to K4] | | | | |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | |
|-----------------|--------------------------|-------------|-------------|------|-------------|-------------|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | |
| CO5 | 1 | 3 | 2 | 3 | 2 | 1 | | |
| Weightage | 10 | 10 | 10 | 11 | 9 | 11 | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

Academic Council Meeting Held On 20.04.2023

K Level

LESSON PLAN

| Unit | Course Name | Hrs | Pedagogy |
|------|---|-----|------------------------------------|
| I | THERMODYNAMICS – I Definition of thermodynamic terms: system, surroundings – types of systems, intensive and extensive properties – State and path functions and their differentials – Thermodynamic process – Concept of heat and work – Definition of internal energy and enthalpy. Heat capacity – Heat capacities at constant volume and pressure and their relationship – Joule- Thomson effect – Joule-Thomson coefficient and inversion temperature – Calculation of w, q, dU & dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process – Hess's Law of constant heat summation and its applications | 18 | Chalk, Talk & Power point |
| Π | THERMODYNAMICS – II Need for the second law-different statements of the second law-Carnot cycle and efficiency. Entropy as state function – entropy as a function of pressure and volume – Entropy changes of an ideal gas – physical significances of entropy – Clausius inequality – entropy as criteria of spontaneity and equilibrium. Gibbs function (G) and Helmholts function (H) as thermodynamics quantities – Gibbs-Helmholts equation. Clausius Clapeyron equation- Application of Clausius- Clapeyron equation – Limitations of second law. | 18 | Chalk, Talk & Power point |
| III | PHOTOCHEMISTRY Definition of photochemical reactions – comparative study of thermal and photochemical reactions – laws of photochemistry – Lambert and Beer Law – Grothus – Draper law – Stark – Einstein law – quantum efficiency and its determination – Jablonski diagram – Photophysical processes – fluorescence phosphorescene and other deactivating processes. Photochemical processes – kinetics of photochemical reactions (H ₂ /Br ₂ reaction) – Photochemical equilibrium (Dimerisation of anthracene)– flash photolysis – photosensitization- chemiluminescence – bioluminescence. | 18 | Chalk, Talk & Power point |
| IV | ELECTROCHEMISTRY – I Conductance-definition and determination of Specific conductance, | 18 | Chalk, Talk & Power |

| | equivalent conductance and molar conductance – variation of equivalent conductance with dilution – Migration of ions - Kohlrausch's law – Arrhenius theory of electrolyte dissociation and its limitations - Ostwald's dilution law – Debye Huckel-Onsagar's equation for strong electrolytes (elementary treatment only) – Definition of transport number – determination by Hittorfs method – Application of conductivity measurements- determination of solubility products of sparingly soluble salts and conductometric titrations – HCl Vs NaOH, | | point |
|---|--|----|------------------------------------|
| | CH3COOH Vs NaOH. | | |
| V | ELECTROCHEMISTRY – II a) Single electrode potential, sign convention, Reversible and irreversible cells, conditions for a cell to be a reversible and irreversible – Nernst Equation – measurement of Emf (Poggendorff's method) types of electrodes – reference electrode (SHE, Calomel electrode, Ag-AgCl electrode) Potentiometric titrations – HCl Vs NaOH and K₂Cr₂O₇ Vs FeSO₄. b) Commercial cells: Primary and secondary batteries – dry cell – lead storage cell – fuel cell – Hydrogen-Oxygen fuel cell | 18 | Chalk, Talk & Power point |

Course Designed by: Dr. R. Satheesh & Dr. A.J. Sunija

Learning Outcome Based Education & Assessment (LOBE) **Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)** Section A Section B Short **MCQs** Answers Section C Section D Inte No. Cos K Level **Either or** Open rnal of. Choice Choice К-No. of. K – Level Que Questions Level stio ns **CO1** Up to K2 2 K1 & K2 K1 2 (K2&K2) 1(K2) 1 CI 2 K2 2(K2 & K3) AI **CO2** Up to K3 2 K1 & K2 2 (K3&K3) **CO3** Up to K3 2 K1 & K2 1 K1 1(K2) 2 (K2&K2) CI K1 & K2 AII **CO4** Up to K4 2 2 K2 2 (K3&K3) 2(K3 &K4) No. of 4 Questions to be 3 4 3 asked No. of Question Questions to be 4 3 2 2 Pattern answered CIA I & II Marks for each 2 5 1 10 question Total Marks for 4 6 10 20 each section

Volume VI – Science Syllabus / 2023 - 2024

| | Distribution of Marks with K Level CIA I & CIA II | | | | | | | | | | |
|-----|---|--|---|---|-------------------------------|----------------|--------------------------------------|---------------------|--|--|--|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % | | | |
| | K1 | 2 | 2 | - | - | 4 | 6.67 | | | | |
| | K2 | 2 | 4 | 10 | 20 | 36 | 60 | 67 | | | |
| CIA | K3 | - | - | 10 | 10 | 20 | 33.33 | 33 | | | |
| I | K4 | - | - | - | - | - | - | - | | | |
| - | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 | | | |
| | K1 | 2 | 2 | - | - | 4 | 6.67 | | | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 43.33 | 50 | | | |
| CIA | K3 | - | - | 10 | 10 | 20 | 33.33 | 33 | | | |
| Π | K4 | - | - | - | 10 | 10 | 16.67 | 17 | | | |
| | Marks | 4 | 6 | 20 | 30 | 60 | 100 | 100 | | | |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| S | Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs) | | | | | | | | | |
|-----------------------------------|---|---------------|---------------------|--------------|------------------------|--------------|----------------------------|-------------------------------|--|--|
| | | | MC | | Short A | nswers | Section C | Carther D | | |
| S.No | Cos | K - Level | No. of Questions | K – Level | No. of Questio n | K – Level | (Either / or Choice) | Section D (Open Choice) | | |
| 1 | CO1 | Up to K 2 | 2 | K1, K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | |
| 2 | CO2 | Upto K 3 | 2 | K1&K2 | 1 | K1 | 2 (K3&K3) | 1(K3) | | |
| 3 | CO3 | Up to K 3 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K3) | | |
| 4 | CO4 | Up to K 4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | | |
| 5 | CO5 | Up to K 4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | | |
| No. of | Questions | s to be Asked | 10 | | 5 | | 10 | 5 | | |
| No.of Questions to be answered | | 10 | | 5 | | 5 | 3 | | | |
| Marks for each question | | 1 | | 2 | | 5 | 10 | | | |
| Total Marks for each section | | 10 | | 10 | | 25 | 30 | | | |
| (| (Figures | in parenthesi | is denotes, qu | estions sh | ould be asl | ked with | the given K | level) | | |

| Distribution of Marks with K Level | | | | | | | |
|--|--------------------|------------|-------------|-----------|-------|---------|--------------|
| K | Section A | Section B | Section C | Section D | Total | % of | Consolidated |
| Level | (Multiple | (Short | (Either/ or | (Open | Marks | (Marks | % |
| | Choice | Answer | Choice) | Choice) | | without | |
| | Questions) | Questions) | | | | choice) | |
| K1 | 5 | 4 | - | - | 9 | 7.5 | 22 |
| K2 | 5 | 6 | 10 | 10 | 31 | 25.83 | 33 |
| K3 | - | - | 40 | 20 | 60 | 50 | 50 |
| K4 | - | - | - | 20 | 20 | 16.67 | 17 |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 |
| NB: Higher level of performance of the students is to be assessed by attempting higher level | | | | | | | |

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

| Section | A (Mu | Itiple Cho | ice Questions) |
|----------|---------|------------|--|
| Answer | r All Q | uestions | (10x1=10 marks) |
| Q.No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| Section | B (Sho | ort Answei | rs) |
| Answei | r All Q | uestions | (5x2=10 marks) |
| Q.No | СО | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| Section | C (Eit | her/Or Ty | pe) |
| Answer | r All Q | uestions | (5 x 5 = 25 marks) |
| Q.No | CO | K Level | Questions |
| 16) a | CO1 | K2 | |
| 16) b | CO1 | K2 | |
| 17) a | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K3 | |
| 19) b | CO4 | K3 | |
| 20) a | CO5 | K3 | |
| 20) b | CO5 | K3 | |
| | | | ormance of the students is to be assessed by attempting higher |
| level of | | | |
| | | en Choice | |
| | | Three ques | |
| Q.No | CO | K Level | Questions |
| 21 | CO1 | K2 | |
| 22 | CO2 | K3 | |
| 23 | CO3 | K3 | |
| 24 | CO4 | K4 | |
| 25 | CO5 | K4 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | MAJOR CHEMISTRY PRACTICAL – IV (GRAVIMETRIC ANALYSIS AND ORGANIC PREPARATION) | | | | | | | |
|---|--|------------|---|--------------|--|--|--|--|
| Course Code | 21UCHCP4 | L | Р | С | | | | |
| Category | Core | - | 3 | 5 | | | | |
| Nature of cours | e: EMPLOYABILITY 🗸 SKILL ORIENTED 🖌 ENTREPREN | ENURSHIP 🗸 | | \checkmark | | | | |
| Course Objecti | ves: | | | | | | | |
| To learn | the concept of gravimetric analysis and organic preparation | | | | | | | |
| • To analy | | | | | | | | |
| • To study | • To study the organic preparation methods | | | | | | | |
| • To understand the various organic preparation methods | | | | | | | | |
| • To interp | pret the gravimetric analysis and organic preparation | | | | | | | |
| List | t of Experiments | | | | | | | |
| 1. Gravim | etric Analysis | | | | | | | |
| Estimation of lead as lead chromate Estimation of barium as barium chromate Estimation of calcium as calcium oxalate monohydrate Estimation of copper as cuprous thiocyanate Estimation of nickel as Ni DMG. 2. Organic Preparation Nitration M-dinitrobenzene from nitrobenzene Picric acid from phenol Bromination: p-bromo acetanilide from acetanilide Hydrolysis : Aromatic acid from (a) an ester (b) an amide Oxidation: Benzoic acid from benzaldehyde. Benzoylation: (a) Amine (b) phenols. | | | | | | | | |
| Regular Test in Observation not Total | | | | | | | | |

Volume VI – Science Syllabus / 2023 - 2024 Record Note Book - 10 Marks Viva Voce - 10 Marks Ext: 60 **Organic preparation (10 Marks) Gravimetric Estimation (30 Marks)** Procedure 2 Marks Procedure - 10 Marks Crude sample 6 Marks Estimation - 20 Marks Recrystallised sample -Less than 2 % Error – 20 Marks 2 Marks 2-3% Error – 18 Marks 3-4% Error - 16 Marks 4-5% Error – 14 Marks Greater than 5% Error – 8 Marks **Total Lecture Hours** 45 Hrs **Books for Reference:** 5. Thomas. A.O and Mani, Textbook of Practical Chemistry, 4th Revised Edition, Scientific Publication, 1976. 6. N.S. Gnana pragasam and G. Ramamurthy, Organic Chemistry Lab Manual, Viswanath. S. Printers & Publishers Pvt. Ltd., 2010, Chennai. Web Resources: 1. https://youtu.be/tftNgFVAWCY 2. https://youtu.be/npxbO-pzUvU 3. https://youtu.be/peMyqdJ57dA **Course Outcomes:** K Level On the completion of the course the student will be able to **CO1:** Relate and classify between gravimetric analysis and organic preparation [Up to K2] **CO2:** Estimate lead, barium, calcium, copper and nickel. [Up to K3] **CO3:** Analyze the various types of organic preparation. [Up to K3] Interpret the organic preparation like nitration, bromination, hydrolysis, **CO4:** [Up to K4] oxidation, benzoylation and acetylation.

CO & PO Mapping:

CO5:

| Course Outcomes | Programme Outcomes (POs) | | | | | | |
|-----------------|--------------------------|-------------|------|------|-------------|------|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | |
| CO5 | 2 | 3 | 1 | 3 | 2 | 1 | |
| Weightage | 11 | 10 | 9 | 11 | 9 | 11 | |

Assemble the analyzed and prepared organic compounds samples.

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

Academic Council Meeting Held On 20.04.2023

[Up to K4]

LESSON PLAN

| UNIT | List of Experiments | Hrs | Mode |
|------|--|-----|-----------|
| | 1. Gravimetric Analysis | | |
| | Estimation of lead as lead chromate Estimation of barium as barium chromate Estimation of calcium as calcium oxalate monohydrate Estimation of copper as cuprous thiocyanate Estimation of nickel as Ni DMG. | | |
| Ι | 2. Organic Preparation | 45 | Practical |
| | 1. Nitration | | |
| | a. M-dinitrobenzene from nitrobenzene | | |
| | b. Picric acid from phenol | | |
| | 2. Bromination: p-bromo acetanilide from acetanilide | | |
| | 3. Hydrolysis : Aromatic acid from (a) an ester (b) an amide | | |
| | 4. Oxidation: Benzoic acid from benzaldehyde. | | |
| | 5. Benzoylation: (a) Amine (b) phenols. | | |
| | 6. Acetylation : (a) Amine (b) phenols | | |

Course Designed by: Dr. K. Muthupandi & Dr. V. Ramasamy Raja



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | MAJOR O ESTIMAT | | Y P | PRACTICAL – V (OR | GANIC AN | NALYSIS A | AND | | |
|---|---------------------------------------|-----------------------------------|--|--|---------------|--------------------|----------------|------|--|
| Course Code | 21UCHCH | 25 | | | | L | Р | C | |
| Category | Core | | | | | - | 3 | 5 | |
| Nature of cours | e: EMPLO | YABILITY | \checkmark | SKILL ORIENTED | ✓ ENTRE | PRENURS | SHIP | ✓ | |
| Course Objecti | ives: | | | | | | | | |
| To learn | the analysis | s of an organ | ic co | ompound containing or | e or two fu | nctional gro | oups. | | |
| • | | ept of confirm | mati | on of the prepared one | or two func | tional orga | nic | | |
| compour | | | | | | | | | |
| • | | - | | e and glucose | _ | | | | |
| | | | | groups of organic com | - | | | | |
| _ | | - | esti | imation of organic com | pounds | | | | |
| I. Organic Ana | t of Experin | nents | | | | | | | |
| and nucl II. ORGANIC 1. Estimati 2. Estimati | ear halogen ESTIMAT on of pheno | compounds, ION 1 e se | dia | dary and tertiary), anil mide containing sulphu n of Marks (Max. marl | r and mono | | | 1141 | |
| | | | | | (8 - 100) | | | | |
| | | Durat | tion | of examination: 6 hrs | | | | | |
| Regular Test in | the Class | : 30 Marks | s | | | | | | |
| Observation not | | : 10 Marks | | | | | | | |
| Total | | : 40 Marks | S | | | | | | |
| | | | - | | | | | | |
| Organic estima | tion (30 Ma | arks) | | Organ | ic analysis (| (30 Marks) |) | | |
| | | | | Viva Voce | | – 10 ma | antra | | |
| Record Note - | 10 marks | | Procedure - 5 marks Preliminary reaction | | | | | | |
| Procedure - | 5 marks | | | • | | - 2 mar | | | |
| Procedure - Estimation - | 5 marks 15 marks | _ | | Elements prese | ent | - 2 mar - 4 mar | ks ks | | |
| Procedure - Estimation - Less than 3% Ex | 5 marks 15 marks | | | • | ent omatic | - 2 mar | ks ks ks | | |

| | | Volume VI – Science Sylla | abus / 2023 - | 2024 |
|----------------|---|------------------------------------|---------------|------------|
| | | | | |
| | 4-5% Error – 10 Marks | Functional group | - 6 marks | |
| | Greater than 5% - 8 Marks | Derivative | - 2 marks | |
| | | | | |
| | Total Lecture Hours | | | |
| Books | for Reference: | | | |
| 1. Th | omas. A.O and Mani, Textbook o | f Practical Chemistry, 4th Revise | ed Edition, S | Scientific |
| Pι | ublication, 1976. | | | |
| 2. N.S | S. Gnana pragasam and G. Ramam | urthy, Organic Chemistry Lab M | lanual, Viswa | anath. S. |
| Printer | rs & Publishers Pvt. Ltd., 2010, Chen | nai. | | |
| Web F | Resources: | | | |
| 1. <u>http</u> | <u>s://youtu.be/1uJk4K_irP8</u> | | | |
| 2. <u>http</u> | <u>s://youtu.be/xQJOfAKgSOY</u> | | | |
| 3. <u>http</u> | <u>s://youtu.be/xMjJxjhJWj4</u> | | | |
| Course | e Outcomes: | | K | Level |
| On th | e completion of the course the stud | ent will be able to | | |
| CO1: | Relate and classify between organic | analysis and estimation of organic | | n to VOI |
| COI: | compounds | | [U] | p to K2] |
| CO2: | Estimate the phenol, aniline and glu | icose | [U] | p to K3] |
| CO3: | Analyze the one or two functional g | roups of organic compounds | | p to K3] |
| CO4: | Interpret the organic analysis and es | | | p to K4] |
| CO5: | Distinguish between analysis and es of organic compounds | | rouns | p to K4] |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | |
|------------------------|--------------------------|------|------|------|------|-------------|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | |
| CO5 | 2 | 3 | 1 | 3 | 2 | 1 | |
| Weightage | 11 | 10 | 9 | 11 | 9 | 11 | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| UNIT | List of Experiments | Hrs | Mode |
|------|--|-----|-----------|
| I | I. Organic Analysis Analysis of an organic compound containing one or two functional groups and confirmation by the preparation of a solid derivative – acids, phenols, aldehydes, ketone, esters, nitro compounds, amines (primary, secondary and tertiary), aniline, aliphatic diamide, side chain and nuclear halogen compounds, diamide containing sulphur and monosaccharide. II. ORGANIC ESTIMATION Estimation of phenol Estimation of glucose | 45 | Practical |

Course Designed by: Dr. V. Ramasamy Raja & Dr. A.J. Sunija



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) **DEPARTMENT OF CHEMISTRY** (For those who joined in 2021-2022 and after)

| Course Name | PR | PROJECT AND VIVA - VOCE | | | | | | | | |
|-----------------|-----|-------------------------|----------------|--------|------|------|-----|--|--|--|
| Course Code | 210 | IUCHPR1 | | | | | С | | | |
| Category | Pro | Project | | | | | 4 | | | |
| Nature of cours | se: | EMPLOYABILITY | SKILL ORIENTED | ENTREP | RENU | JRSH | IIP | | | |

Course Objectives:

To identify, describe the problem and scope of project

- To collect, analyse and present data into significant form using appropriate tools. •
- To choose, plan and implement a proper approach in problem solving.
- To work with team and ethically.
- To present the findings in both oral and written form

Course Description

• The Project is conducted by the following Course Pattern.

Internal

| Internal | |
|----------------|----------|
| Presentation | |
| Submission | 40 |
| External | |
| Project Report | 60 |
| Viva Voce | } |
| | |
| | |
| | 60 |

Total - 100

| COUR | COURSE OUTCOMES | | | | | | |
|-------------|---|----|--|--|--|--|--|
| On the | e successful completion of the course , the students will be able to | | | | | | |
| CO1: | Apply the skill of presentation and communication techniques | K3 | | | | | |
| CO2: | Motive as an individual or in a team in development of projects. | K4 | | | | | |
| CO3: | Analyze the available resources and to select most appropriate one | K4 | | | | | |
| CO4: | Make use of the fundamentals of Chemistry to search the related literature survey | К3 | | | | | |
| CO5: | Explain the real life problems by using Chemistry and its Application. | K4 | | | | | |

Course Designed by: Dr. V. Ramasamy Raja, & Dr. A.J. Sunija

CO & PO Mappings:

| COS | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 |
|------|-------------|-------------|-------------|------|-------------|-------------|
| CO 1 | 2 | 2 | 2 | 2 | 1 | 3 |
| CO 2 | 1 | 2 | 2 | 1 | 2 | 3 |
| CO 3 | 2 | 2 | 2 | 2 | 2 | 1 |
| CO 4 | 3 | 2 | 2 | 2 | 1 | 2 |
| CO 5 | 3 | 2 | 2 | 1 | 2 | 3 |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | APPLIED CHEMISTRY | | | | | | | | | |
|---|--|---------|-------|--------------|--|--|--|--|--|--|
| Course Code | 21UCHE61 | L | Р | С | | | | | | |
| Category | CORE ELECTIVE | 5 | - | 5 | | | | | | |
| Nature of cours | e: EMPLOYABILITY 🗸 SKILL ORIENTED 🖌 ENTREPREN | URS | HIP | \checkmark | | | | | | |
| Course Objecti | ives: | | | | | | | | | |
| • To Recall th | e water treatment and quality analysis of water | | | | | | | | | |
| • To Remember the insecticides, pesticides and preparation of chemicals | | | | | | | | | | |
| To Compare | e the knowledge of match and silicate industry | | | | | | | | | |
| To Perform | the elemental study of petrochemicals and lacquer paint | | | | | | | | | |
| To Determin | ne the nutrients for plants and know the fertilizer industry in India | | | | | | | | | |
| Unit: I WA | ATER AND SEWAGE TREATMENT | | 15 | | | | | | | |
| Water Treatmen | nt: Water Quality Analysis - Chemical and Physical Analysis of w | ater - | Qua | ılity | | | | | | |
| Parameters – St | tandards prescribed for Water Quality by WHO and other Indian st | andar | ds – | Sea | | | | | | |
| | ce of Drinking Water - Electro dialysis method and Reverse osmo | | | | | | | | | |
| · · · | water. Sewage Treatment: Municipal Waste Water - Sewage Treatm | nent – | Aero | obic | | | | | | |
| | process – Miscellaneous Method of Sewage Treatment | | | | | | | | | |
| | SECTICIDES, PESTICIDES AND PREPARATION OF CHEMI | | | | | | | | | |
| | Pesticides: Definition – Classification – Inorganic pesticides: lead | | | | | | | | | |
| U | phur, hydrocyanic acid – Organic pesticides, natural, synthetic (DDT | , Gam | maxe | ene) | | | | | | |
| – Fungicides – r | * | | | | | | | | | |
| | ATCH AND SILICATE INDUSTRY | | 15 | | | | | | | |
| • | : Pyrotechnics and explosives - Raw materials needed for mat | | | | | | | | | |
| • | process – Pyrotechniques – Coloured smokes. Silicate Industry: Cen | nent C | lass | and | | | | | | |
| | materials and manufacture of Cement, Glass and Ceramics. | | | | | | | | | |
| | FROCHEMICALS AND LACQUER PAINT | | 15 | | | | | | | |
| | Elementary study – Definition – Origin – Composition – Chemical | | | | | | | | | |
| | Light Naphtha and Kerosene – Synthetic Gasoline. Paints and lacque | ers: Pi | gmen | ts – | | | | | | |
| Y | ents in Paints – Manufacture – Lacquers – Varnishes. | | | , | | | | | | |
| | RTILIZERS | 1 1 | 15 | | | | | | | |
| | rients for plants – role of various elements in plants growth – natura | | | | | | | | | |
| | fication of chemical fertilizers –urea, super phosphate and potassium | i nitra | te-mi | xea | | | | | | |
| Tertifizer-Tertifiz | er industry in India. | | 75 TT | | | | | | | |
| Doolse for Stud | Total Lecture Ho | urs | 75 H | rs | | | | | | |
| Books for Stud | y: | | | | | | | | | |
| | K, Industrial Chemistry including Chemical Engineering, Goel Publi d enlarged Edition, 2009, New Delhi. | shing | Hous | se – | | | | | | |
| Books for Refe | | | | | | | | | | |
| 1. Srilakshmi. | B, Food Science, 3rd Edition, New Age International Pvt. Ltd., Publi | shers, | 2002 | 2. | | | | | | |
| | Shosh, Fundamental concepts of Applied Chemistry, S. Chand & C | | | | | | | | | |
| 1998. | | | | | | | | | | |
| 3. Thanlamma | Jacob, Text Books of Applied Chemistry for Home Science and A | llied S | Scien | ces, | | | | | | |

| Ma | cmillan, 2000. | | | | | | | |
|-----|--|------------|--|--|--|--|--|--|
| We | Web Resources: | | | | | | | |
| 1. | 1. <u>https://youtu.be/FY7z9ymxXFQ</u> | | | | | | | |
| 2. | nttps://youtu.be/cLZ_PQhOnDY | | | | | | | |
| Cou | urse Outcomes | K Level | | | | | | |
| On | the completion of the course the student will be able to | | | | | | | |
| СО | Define insecticides, petrochemicals and fertilizers and discuss | [Up to K2] | | | | | | |
| | their classification. | | | | | | | |
| СО | 2. Determine water quality, raw materials needed for match and silicate | [Up to K3] | | | | | | |
| co | ² industries. | | | | | | | |
| со | a. Distinguish between water and sewage treatment and chemicals used between | [Up to K3] | | | | | | |
| CO | petrochemicals and paints and lacquers. | | | | | | | |
| CO | 4: Interpret the preparation of domestically useful chemical products. | [Up to K4] | | | | | | |
| CO | 5: Integrate the method of sewage treatment and fertilizer industries in India. | [Up to K4] | | | | | | |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | |
|-----------------|--------------------------|-------------|-------------|------|-------------|------|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | |
| CO5 | 1 | 3 | 2 | 3 | 2 | 1 | | |
| Weightage | 10 | 10 | 10 | 11 | 9 | 11 | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| Unit | Course Name | Hrs | Pedagogy |
|------|--|-----|------------------------------------|
| Ι | WATER AND SEWAGE TREATMENTWater Treatment: Water Quality Analysis – Chemical and PhysicalAnalysis of water - Quality Parameters – Standards prescribed for WaterQuality by WHO and other Indian standards – Sea Water as a source ofDrinking Water – Electro dialysis method and Reverse osmosis methodfor purifications of water. Sewage Treatment: Municipal Waste Water –Sewage Treatment – Aerobic and Anaerobic process – MiscellaneousMethod of Sewage Treatment | 15 | Chalk, Talk & Power point |
| II | INSECTICIDES, PESTICIDES AND PREPARATION OF CHEMICALS Insecticides and Pesticides: Definition – Classification – Inorganic pesticides: lead arsenate, Paris green, lime, sulphur, hydrocyanic acid – Organic pesticides, natural, synthetic (DDT, Gammaxene) – Fungicides – repellants. | 15 | Chalk, Talk & Power point |
| III | MATCH AND SILICATE INDUSTRY Match Industry: Pyrotechnics and explosives – Raw materials needed for match industry – Manufacturing process – Pyrotechniques – Coloured smokes. Silicate Industry: Cement Glass and Ceramics, Raw materials and manufacture of Cement, Glass and Ceramics. | 15 | Chalk, Talk & Power point |
| IV | PETROCHEMICALS AND LACQUER PAINTPetrochemicals: Elementary study – Definition – Origin – Composition– Chemicals from natural gas, Petroleum, Light Naphtha and Kerosene –Synthetic Gasoline. Paints and lacquers: Pigments – Paints – Ingredientsin Paints – Manufacture – Lacquers – Varnishes. | 15 | Chalk, Talk & Power point |
| V | FERTILIZERS Definition – nutrients for plants – role of various elements in plants growth – natural and chemical fertilizers-classification of chemical fertilizers –urea, super phosphate and potassium nitrate-mixed fertilizer- fertilizer industry in India. | 15 | Chalk, Talk & Power point |

Course Designed by: Dr. V. Ramasamy Raja & Dr. R. Satheesh

| | Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs) | | | | | | | | | | |
|--------------|--|---------------------------------|----------------------|-------------------|---------------------|-----------|---------------------|---------------------|--|--|--|
| T (| | K Level | Secti | Section A MCQs | | on B | Section C | Section | | | |
| Inte rnal | Cos | | No. of. Questions | K – Level | No. of. Question | K - Level | Either or Choice | D Open Choice | | | |
| CI | CO1 | Up to K2 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | |
| AI | CO2 | Up to K3 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K3) | | | |
| CI | CO3 | Up to K3 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | |
| AII | CO4 | Up to K4 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K4) | | | |
| | | No. of Questions to be asked | 4 | | 3 | | 4 | 2 | | | |
| • | estion ttern | No. of Questions to be answered | 4 | | 3 | | 2 | 1 | | | |
| CIA | I & II | Marks for each question | 1 | | 2 | | 5 | 10 | | | |
| | | Total Marks for each section | 4 | | 6 | | 10 | 10 | | | |

| | Distribution of Marks with K Level CIA I & CIA II | | | | | | | | | | |
|-----|---|--|---|---|-------------------------------|----------------|--|---------------------|--|--|--|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Mar ks witho ut choice) | Consolidate of % | | | |
| | K1 | 2 | 2 | - | - | 4 | 8 | | | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 | | | |
| CIA | K3 | - | - | 10 | 10 | 20 | 40 | 40 | | | |
| I | K4 | - | - | - | - | - | - | - | | | |
| - | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 | | | |
| | K1 | 2 | 2 | - | - | 4 | 8 | | | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 | | | |
| CIA | K3 | - | - | 10 | - | 10 | 20 | 20 | | | |
| II | K4 | - | - | - | 10 | 10 | 20 | 20 | | | |
| | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 | | | |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| S | ummativ | ve Examinatio | | nt Articu utcomes | - | ping – K | Level with (| Course |
|--------------------------------|-----------|---------------|---------------------|----------------------|--------------------|--------------|----------------------------|-------------------------------|
| | | | MCC |)s | Short An | swers | Section C | Section D |
| S.No | COs | K - Level | No. of Questions | K – Level | No. of Question | K – Level | (Either / or Choice) | Section D (Open Choice) |
| 1 | CO1 | Up to K2 | 2 | K1,K2 | 1 | K1 | 2 (K2&K2) | 1(K2) |
| 2 | CO2 | Up to K3 | 2 | K1&K 2 | 1 | K1 | 2 (K3&K3) | 1(K3) |
| 3 | CO3 | Up to K3 | 2 | K1&K 2 | 1 | K2 | 2 (K3&K3) | 1(K3) |
| 4 | CO4 | Up to K4 | 2 | K1&K 2 | 1 | K2 | 2 (K3&K3) | 1(K4) |
| 5 | CO5 | Up to K4 | 2 | K1&K 2 | 1 | K2 | 2 (K3&K3) | 1(K4) |
| No. of | Questions | s to be Asked | 10 | | 5 | | 10 | 5 |
| No.of Questions to be answered | | 10 | | 5 | | 5 | 3 | |
| Marks for each question | | 1 | | 2 | | 5 | 10 | |
| Total Marks for each section | | 10 | | 10 | | 25 | 30 | |
| | (Figures | in parenthesi | is denotes, qu | estions s | hould be asl | ked with | the given K | level) |

| | Distribution of Marks with K Level | | | | | | | | | | | |
|---------------------|--|---|-------------------------------------|-------------------------------|----------------|--------------------------------------|-------------------|--|--|--|--|--|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % | | | | | |
| K1 | 5 | 4 | - | - | 9 | 7.5 | 33 | | | | | |
| K2 | 5 | 6 | 10 | 10 | 31 | 25.83 | | | | | | |
| K3 | - | - | 40 | 20 | 60 | 50 | 50 | | | | | |
| K4 | - | - | - | 20 | 20 | 16.67 | 17 | | | | | |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 | | | | | |
| NB: Hig of K lev | , | erformance o | of the students | s is to be asse | essed by a | ttempting | higher level | | | | | |

| Section | A (Mu | Itiple Cho | ice Questions) |
|----------|---------|------------|--|
| Answei | r All Q | uestions | (10x1=10 marks) |
| Q.No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| Section | B (Sho | ort Answei | rs) |
| Answei | r All Q | uestions | (5x2=10 marks) |
| Q.No | СО | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| Section | C (Eit | her/Or Ty | pe) |
| Answer | r All Q | uestions | (5 x 5 = 25 marks) |
| Q.No | CO | K Level | Questions |
| 16) a | CO1 | K2 | |
| 16) b | CO1 | K2 | |
| 17) a | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K3 | |
| 19) b | CO4 | K3 | |
| 20) a | CO5 | K3 | |
| 20) b | CO5 | K3 | |
| | | | ormance of the students is to be assessed by attempting higher |
| level of | | | |
| | | en Choice | |
| | | Three ques | |
| Q.No | CO | K Level | Questions |
| 21 | CO1 | K2 | |
| 22 | CO2 | K3 | |
| 23 | CO3 | K3 | |
| 24 | CO4 | K4 | |
| 25 | CO5 | K4 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Code 21UCHE62 L P C Category CORE ELECTIVE 5 - 5 Nature of course: EMPLOYABILITY SKILL ORIENTED ✓ ENTREPRENURSHIP ✓ Course Objectives: - To Realize the volume and composition of soil and its importance on agriculture - To Parameter the properties of soil To Discuss the various types of micronutrients needed to the soil - </th <th>Course Name</th> <th>SOIL AND AGRICULTURE CHEMIS</th> <th>STRY</th> <th></th> <th></th> <th></th> <th></th> <th></th> | Course Name | SOIL AND AGRICULTURE CHEMIS | STRY | | | | | | |
|--|---|--|------------|-------|-------------------------------|--------|---------|--------------|--|
| Nature of course: EMPLOYABILITY ✓ SKILL ORIENTED ✓ ENTREPRENURSHIP ✓ Course Objectives: • <t< th=""><th>Course Code</th><th>21UCHE62</th><th></th><th></th><th></th><th>L</th><th>Р</th><th>С</th></t<> | Course Code | 21UCHE62 | | | | L | Р | С | |
| Course Objectives: • To Realize the volume and composition of soil and its importance on agriculture • To Realize the volume and composition of soil and its importance on agriculture • To Discuss the various types of micronutrients needed to the soil • To Discuss the neembed of analyzing the soil and applying the fertilizers. Unit: I SOIL COMPONENTS Intervention 15 Definition - volume, composition - uses - mineral soil - chemical ions - soil colloids - importance - nature - properties of inorganic and organic soil colloid - general characteristics - properties and importance - types - silicate clays - silicate - silicato oxygen tetrahedron. Unit: II SOIL SALINITY AND ALKALINITY 15 Saline and alkaline soil - nature - classification - characteristics - formation of saline and alkaline soil - effect. 15 Saline and alkaline soil - nature - classification - characteristics - formation of saline and alkaline soil - effect. 15 Saline and alkaline soil - nature - classification - characteristics - formation of saline and alkaline soil - equality of irrigation water: introduction - criteria - irrigation water resources - water uaity - classification of water. 15 Unit: III ANALYSIS OF SOIL 15 v) Estimation of of soil pH and electrical conductivity. v) Estimation of soil pH and electrical conductivity. v) Estimation of soil pH and electrical conductivity. | Category | CORE ELECTIVE | | | | 5 | - | 5 | |
| To Realize the volume and composition of soil and its importance on agriculture To Remember the properties of soil To Discuss the various types of micronutrients needed to the soil To Analyze the chemical composition of biofertilizer and soil To Formulate the methods of analyzing the soil and applying the fertilizers. Unit: I SOIL COMPONENTS 15 Definition - volume, composition - uses - mineral soil - chemical ions - soil colloids - importance - nature - properties of inorganic and organic soil colloid - general characteristics - properties and importance - types - silicate clays - silicon oxygen tetrahedron. Unit: II SOIL SALINITY AND ALKALINITY 15 Saline and alkaline soil - nature - classification - characteristics - formation of saline and alkaline soil - general characteristics - formation of saline and alkaline soil - aquily of irrigation water: introduction - criteria - irrigation water resources - water quality - classification of water. Unit: II ANALYSIS OF SOIL 15 Di Estimation of Ca, Mg, K and nitrate ii) Analysis of Soluble salt. iii) Analysis of Solub in sustainable agriculture - biodiversity - management strategies - comparison of chemical fertilizer and biofertilizer. Methods of applying fertilizer | Nature of cours | : EMPLOYABILITY 🖌 SKILL ORIE | NTED | √ | ENTREPREN | URS | HIP | \checkmark | |
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| iii) Analysis of NPK in fertilizer. iv) Determination of soil pH and electrical conductivity. v) Estimation of organic matter content of soil. Unit: IV VERMICOMPOSTING 15 Vermicomposting: Economic implications - materials - preliminary treatment - types of vermicomposting - requirements for vermicomposting. Eco-Friendly Farming System: organic farming - concept – options. Unit: V BIOFERTILIZERS 15 Biofertilizers: Soil biota in sustainable agriculture - biodiversity - management strategies - comparison of chemical fertilizer and biofertilizer. Methods of applying fertilizers - application of fertilizer in solid form - liquid fertilizer - nitrogenous fertilizer - types - phosphatic fertilizers: forms - classification- potassic fertilizers: Potassium sulphate: production – properties. Total Lecture Hours 75 Hrs Books for Study: 1. Shivanand Tolanur, Soil Chemistry, International Book Distributing Co., 1st edition, 2006. (Unit I and II) 2. P.K.Gupta, A Handbook of Soil, Fertilizer and Manure, Agrobios (India), 2nd edition, 2012. (Unit III and IV) 3. A. K. Mani, R. Santhi and M. Sellamuthu, A Handbook of Laboratory Analysis, AE | i) Estimation of | Ca, Mg, K and nitrate | | | | | | | |
| iv) Determination of soil pH and electrical conductivity. v) Estimation of organic matter content of soil. Unit: IV VERMICOMPOSTING 15 Vermicomposting: Economic implications - materials - preliminary treatment - types of vermicomposting - requirements for vermicomposting. Eco-Friendly Farming System: organic farming - concept – options. Unit: V BIOFERTILIZERS 15 Biofertilizers: Soil biota in sustainable agriculture - biodiversity - management strategies - comparison of chemical fertilizer and biofertilizer. Methods of applying fertilizers - application of fertilizer in solid form - liquid fertilizer - nitrogenous fertilizer - types - phosphatic fertilizers: forms - classification- potassic fertilizers: Potassium sulphate: production – properties. Total Lecture Hours 75 Hrs Books for Study: 1. Shivanand Tolanur, Soil Chemistry, International Book Distributing Co., 1st edition, 2006. (Unit I and II) P.K.Gupta, A Handbook of Soil, Fertilizer and Manure, Agrobios (India), 2nd edition, 2012. (Unit III and IV) A. K. Mani, R. Santhi and M. Sellamuthu, A Handbook of Laboratory Analysis, AE | | | | | | | | | |
| v) Estimation of organic matter content of soil. Unit: IV VERMICOMPOSTING 15 Vermicomposting: Economic implications - materials - preliminary treatment - types of vermicomposting - requirements for vermicomposting. Eco-Friendly Farming System: organic farming - concept – options. Unit: V BIOFERTILIZERS 15 Biofertilizers: Soil biota in sustainable agriculture - biodiversity - management strategies - comparison of chemical fertilizer and biofertilizer. Methods of applying fertilizers - application of fertilizer in solid form - liquid fertilizer - nitrogenous fertilizer - types - phosphatic fertilizers: forms - classification- potassic fertilizers: Potassium sulphate: production – properties. Total Lecture Hours 75 Hrs Books for Study: Shivanand Tolanur, Soil Chemistry, International Book Distributing Co., 1st edition, 2006. (Unit I and II) P.K.Gupta, A Handbook of Soil, Fertilizer and Manure, Agrobios (India), 2nd edition, 2012. (Unit III and IV) A. K. Mani, R. Santhi and M. Sellamuthu, A Handbook of Laboratory Analysis, AE | | | | | | | | | |
| Unit: IVVERMICOMPOSTING15Vermicomposting:Economic implications - materials - preliminary treatment - types of vermicomposting - requirements for vermicomposting. Eco-Friendly Farming System: organic farming - concept - options.15Unit: VBIOFERTILIZERS15Biofertilizers:Soil biota in sustainable agriculture - biodiversity - management strategies - comparison of chemical fertilizer and biofertilizer. Methods of applying fertilizers - application of fertilizer in solid form - liquid fertilizer - nitrogenous fertilizer - types - phosphatic fertilizers: forms - classification- potassic fertilizers: Potassium sulphate: production - properties.75 HrsBooks for Study:11.Shivanand Tolanur, Soil Chemistry, International Book Distributing Co., 1st edition, 2006. (Unit I and II)206. (Unit II and IV)2.P.K.Gupta, A Handbook of Soil, Fertilizer and Manure, Agrobios (India), 2 nd edition, 2012. (Unit III and IV)3.A. K. Mani, R. Santhi and M. Sellamuthu, A Handbook of Laboratory Analysis, AE | | | | | | | | | |
| Vermicomposting: Economic implications - materials - preliminary treatment - types of vermicomposting - requirements for vermicomposting. Eco-Friendly Farming System: organic farming - concept - options. Unit: V BIOFERTILIZERS 15 Biofertilizers: Soil biota in sustainable agriculture - biodiversity - management strategies - comparison of chemical fertilizer and biofertilizer. Methods of applying fertilizers - application of fertilizer in solid form - liquid fertilizer - nitrogenous fertilizer - types - phosphatic fertilizers: forms - classification- potassic fertilizers: Potassium sulphate: production - properties. 75 Hrs Books for Study: 1. Shivanand Tolanur, Soil Chemistry, International Book Distributing Co., 1st edition, 2006. (Unit I and II) 2. P.K.Gupta, A Handbook of Soil, Fertilizer and Manure, Agrobios (India), 2 nd edition, 2012. (Unit III and IV) 3. A. K. Mani, R. Santhi and M. Sellamuthu, A Handbook of Laboratory Analysis, AE | | | | | | | | | |
| vermicomposting - requirements for vermicomposting. Eco-Friendly Farming System: organic farming - concept – options. [15] Biofertilizers: Soil biota in sustainable agriculture - biodiversity - management strategies - comparison of chemical fertilizer and biofertilizer. Methods of applying fertilizers - application of fertilizer in solid form - liquid fertilizer - nitrogenous fertilizer - types - phosphatic fertilizers: forms - classification- potassic fertilizers: Potassium sulphate: production – properties. [10] Books for Study: [10] [11] [12] [13] [13] [13] [13] [13] [13] [13] [13 | | | | | | | - | | |
| farming - concept - options. 15 Unit: V BIOFERTILIZERS 15 Biofertilizers: Soil biota in sustainable agriculture - biodiversity - management strategies - comparison of chemical fertilizer and biofertilizer. Methods of applying fertilizers - application of fertilizer in solid form - liquid fertilizer - nitrogenous fertilizer - types - phosphatic fertilizers: forms - classification- potassic fertilizers: Potassium sulphate: production - properties. 75 Hrs Books for Study: 1. Shivanand Tolanur, Soil Chemistry, International Book Distributing Co., 1st edition, 2006. (Unit I and II) 2. P.K.Gupta, A Handbook of Soil, Fertilizer and Manure, Agrobios (India), 2 nd edition, 2012. (Unit III and IV) 3. A. K. Mani, R. Santhi and M. Sellamuthu, A Handbook of Laboratory Analysis, AE | Vermicompostin | g: Economic implications - materials | - pre | limi | nary treatmen | t - 1 | types | of | |
| Unit: V BIOFERTILIZERS 15 Biofertilizers: Soil biota in sustainable agriculture - biodiversity - management strategies - comparison of chemical fertilizer and biofertilizer. Methods of applying fertilizers - application of fertilizer in solid form - liquid fertilizer - nitrogenous fertilizer - types - phosphatic fertilizers: forms - classification- potassic fertilizers: Potassium sulphate: production – properties. Total Lecture Hours 75 Hrs Books for Study: 1 Shivanand Tolanur, Soil Chemistry, International Book Distributing Co., 1st edition, 2006. (Unit I and II) P.K.Gupta, A Handbook of Soil, Fertilizer and Manure, Agrobios (India), 2 nd edition, 2012. (Unit III and IV) 3. A. K. Mani, R. Santhi and M. Sellamuthu, A Handbook of Laboratory Analysis, AE | vermicompostin | ; - requirements for vermicomposting. | Eco-Fri | end | ly Farming Sy | stem: | org | anic | |
| Biofertilizers: Soil biota in sustainable agriculture - biodiversity - management strategies - comparison of chemical fertilizer and biofertilizer. Methods of applying fertilizers - application of fertilizer in solid form - liquid fertilizer - nitrogenous fertilizer - types - phosphatic fertilizers: forms - classification- potassic fertilizers: Potassium sulphate: production – properties. Total Lecture Hours 75 Hrs Books for Study: 75 Hrs 1. Shivanand Tolanur, Soil Chemistry, International Book Distributing Co., 1st edition, 2006. (Unit I and II) 2006. (Unit I and II) 2. P.K.Gupta, A Handbook of Soil, Fertilizer and Manure, Agrobios (India), 2 nd edition, 2012. (Unit III and IV) 3. A. K. Mani, R. Santhi and M. Sellamuthu, A Handbook of Laboratory Analysis, AE | farming - conce | t – options. | | | | | | | |
| comparison of chemical fertilizer and biofertilizer. Methods of applying fertilizers - application of fertilizer in solid form - liquid fertilizer - nitrogenous fertilizer - types - phosphatic fertilizers: forms - classification- potassic fertilizers: Potassium sulphate: production – properties. Total Lecture Hours 75 Hrs Books for Study: 1. 1. Shivanand Tolanur, Soil Chemistry, International Book Distributing Co., 1st edition, 2006. (Unit I and II) 2. P.K.Gupta, A Handbook of Soil, Fertilizer and Manure, Agrobios (India), 2 nd edition, 2012. (Unit III and IV) 3. A. K. Mani, R. Santhi and M. Sellamuthu, A Handbook of Laboratory Analysis, AE | | | | | | | | | |
| fertilizer in solid form - liquid fertilizer - nitrogenous fertilizer - types - phosphatic fertilizers: forms - classification- potassic fertilizers: Potassium sulphate: production – properties. Total Lecture Hours 75 Hrs Books for Study: 1. Shivanand Tolanur, Soil Chemistry, International Book Distributing Co., 1st edition, 2006. (Unit I and II) 2. P.K.Gupta, A Handbook of Soil, Fertilizer and Manure, Agrobios (India), 2 nd edition, 2012. (Unit III and IV) 3. A. K. Mani, R. Santhi and M. Sellamuthu, A Handbook of Laboratory Analysis, AE | | | | | | | - | | |
| forms - classification- potassic fertilizers: Potassium sulphate: production – properties. Total Lecture Hours 75 Hrs Books for Study: 1. Shivanand Tolanur, Soil Chemistry, International Book Distributing Co., 1st edition, 2006. (Unit I and II) 2006. 2. P.K.Gupta, A Handbook of Soil, Fertilizer and Manure, Agrobios (India), 2 nd edition, 2012. (Unit III and IV) 3. 3. A. K. Mani, R. Santhi and M. Sellamuthu, A Handbook of Laboratory Analysis, AE | · · | | - | ••• | • | | | | |
| Total Lecture Hours 75 Hrs Books for Study: 75 Hrs 1. Shivanand Tolanur, Soil Chemistry, International Book Distributing Co., 1st edition, 2006. (Unit I and II) 2006. (Unit I and II) 2. P.K.Gupta, A Handbook of Soil, Fertilizer and Manure, Agrobios (India), 2 nd edition, 2012. (Unit III and IV) 2012. (Unit III and IV) 3. A. K. Mani, R. Santhi and M. Sellamuthu, A Handbook of Laboratory Analysis, AE 2012. (Unit III and IV) | | | | | | | ertiliz | ers: | |
| Books for Study: Shivanand Tolanur, Soil Chemistry, International Book Distributing Co., 1st edition, 2006. (Unit I and II) P.K.Gupta, A Handbook of Soil, Fertilizer and Manure, Agrobios (India), 2nd edition, 2012. (Unit III and IV) A. K. Mani, R. Santhi and M. Sellamuthu, A Handbook of Laboratory Analysis, AE | forms - classific | tion- potassic fertilizers: Potassium sulpha | - | | · · · | 1 | | | |
| Shivanand Tolanur, Soil Chemistry, International Book Distributing Co., 1st edition, 2006. (Unit I and II) P.K.Gupta, A Handbook of Soil, Fertilizer and Manure, Agrobios (India), 2nd edition, 2012. (Unit III and IV) A. K. Mani, R. Santhi and M. Sellamuthu, A Handbook of Laboratory Analysis, AE | | | | To | tal Lecture Ho | urs | 75 H | [rs | |
| (Unit I and II) P.K.Gupta, A Handbook of Soil, Fertilizer and Manure, Agrobios (India), 2nd edition, 2012. (Unit III and IV) A. K. Mani, R. Santhi and M. Sellamuthu, A Handbook of Laboratory Analysis, AE | Books for Stud | : | | | | | | | |
| P.K.Gupta, A Handbook of Soil, Fertilizer and Manure, Agrobios (India), 2nd edition, 2012. (Unit III and IV) A. K. Mani, R. Santhi and M. Sellamuthu, A Handbook of Laboratory Analysis, AE | 1. Shivanand To | lanur, Soil Chemistry, International Book | Distribu | ıtin | g Co., 1st editio | on, 20 | 06. | | |
| (Unit III and IV) 3. A. K. Mani, R. Santhi and M. Sellamuthu, A Handbook of Laboratory Analysis, AE | | | | | | | | | |
| 3. A. K. Mani, R. Santhi and M. Sellamuthu, A Handbook of Laboratory Analysis, AE | - | | Agrobi | os (| India), 2 nd editi | on, 20 |)12. | | |
| | • | · | ofLab | rat | ory Analysis A | F | | | |
| | | | | ла | ory Analysis, A | Ľ | | | |

Books for References:

- 1. S. P. Majumdar and R. A. Singh, Analysis of Soil Physical Properties, Agrobios (India), 2012.
- 2. Pooja Kashyap, Agricultural Chemistry, Rajat Pubublications, New Delhi, 1st Published, 2009.

Web Resources:

Course Outcomes

- 1. https://youtu.be/iaQjEDYyWKw
- 2. https://youtu.be/brKftIwoPjw
- 3. https://youtu.be/xEvo9udghgw
- 4. https://youtu.be/oJCBVfr3Mxw

K Level

| On th | On the completion of the course the student will be able to | | | | | | | |
|-------------|--|------------|--|--|--|--|--|--|
| CO1: | : Ability to understand the soil components and its composition [Up to K | | | | | | | |
| CO2: | Discuss the soil salinity and alkalinity and formation of saline and alkaline soil | [Up to K3] | | | | | | |
| CO3: | Interpret the chemical composition of soil | [Up to K3] | | | | | | |
| CO4: | Examine the vermicomposting and ecofriendly farming | [Up to K4] | | | | | | |
| CO5: | Analyze the biofertilizers and methods of applying fertilizers | [Up to K4] | | | | | | |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | |
|-----------------|--------------------------|-------------|-------------|------|------|------|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | |
| CO5 | 1 | 3 | 2 | 3 | 2 | 1 | | |
| Weightage | 10 | 10 | 10 | 11 | 9 | 11 | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| Unit | Course Name | Hrs | Pedagogy |
|------|---|-----|------------------------------------|
| I | SOIL COMPONENTS Definition - volume, composition - uses - mineral soil - chemical ions - soil colloids - importance - nature - properties of inorganic and organic soil colloid - general characteristics - properties and importance - types - silicate clays - silicates - silicon oxygen tetrahedron. SOIL SALINITY AND ALKALINITY | 15 | Chalk, Talk & Power point |
| п | Saline and alkaline soil - nature - classification - characteristics - formation of saline and alkaline soil - effects - quality of irrigation water: introduction - criteria - irrigation water resources - water quality - classification of water. | 15 | Chalk, Talk & Power point |
| ш | ANALYSIS OF SOIL i) Estimation of Ca, Mg, K and nitrate ii) Analysis of soluble salt. iii) Analysis of NPK in fertilizer. iv) Determination of soil pH and electrical conductivity. v) Estimation of organic matter content of soil. | 15 | Chalk, Talk & Power point |
| IV | VERMICOMPOSTING Vermicomposting: Economic implications - materials - preliminary treatment - types of vermicomposting - requirements for vermicomposting. Eco-Friendly Farming System: organic farming - concept – options | 15 | Chalk, Talk & Power point |
| V | BIOFERTILIZERS Biofertilizers: Soil biota in sustainable agriculture - biodiversity - management strategies - comparison of chemical fertilizer and biofertilizer. Methods of applying fertilizers - application of fertilizer in solid form - liquid fertilizer - nitrogenous fertilizer - types - phosphatic fertilizers: forms - classification- potassic fertilizers: Potassium sulphate: production – properties. | 15 | Chalk, Talk & Power point |

Course Designed by: Dr. K. Muthupandi & Dr. A.J. Sunija

| | | C C | Formative | Based Educ Examination K Levels wit | n - Blue P | rint | . , | |
|--------------|--------------------------|---------------------------------------|--------------------------|---|--------------------------|------------------|---------------------|---------------------|
| | | K Level | Sect | tion A CQs | Sect | ion B Answers | Section C | Section |
| Inte rnal | Cos | | No. of. Questio ns | K – Level | No. of. Questi ons | K - Level | Either or Choice | D Open Choice |
| CI | CO1 | Up to K2 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) |
| AI | CO2 | Up to K3 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K3) |
| CI | CO3 | Up to K3 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) |
| AII | CO4 | Up to K4 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K4) |
| | | No. of Questions to be asked | 4 | | 3 | | 4 | 2 |
| Pat | estion tern I & II | No. of Questions to be answered | 4 | | 3 | | 2 | 1 |
| | 1 & 11 | Marks for each question | 1 | | 2 | | 5 | 10 |
| | | Total Marks for each section | 4 | | 6 | | 10 | 10 |

| | Distribution of Marks with K Level CIA I & CIA II | | | | | | | | | | | |
|-----|---|--|---|---|----------------------------------|----------------|--------------------------------------|---------------------|--|--|--|--|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % | | | | |
| | K1 | 2 | 2 | - | - | 4 | 8 | | | | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 | | | | |
| CIA | K3 | - | - | 10 | 10 | 20 | 40 | 40 | | | | |
| I | K4 | - | - | - | - | - | - | - | | | | |
| | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 | | | | |
| | K1 | 2 | 2 | - | - | 4 | 8 | | | | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 | | | | |
| CIA | K3 | - | - | 10 | - | 10 | 20 | 20 | | | | |
| II | K4 | - | - | - | 10 | 10 | 20 | 20 | | | | |
| | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 | | | | |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| S | ummativ | ve Examinatio | on – Blue Pi | rint Articu | lation Map | ping – K | Level with C | ourse |
|-----------------------------------|-------------------------------------|--------------------|---------------|-----------------|--------------|-----------------|---------------|---------|
| | | | (| Outcomes | (COs) | | | |
| | | MC | Qs | Short An | swers | Section C | Section D | |
| S.No | 0 COs K - Level | No. of Question | K – | No. of | K – | (Either / | (Open | |
| | | | S | Level | Question | Level | or Choice) | Choice) |
| 1 | CO1 | Up to K2 | 2 | K1,K2 | 1 | K1 | 2 (K2&K2) | 1(K2) |
| 2 | CO2 | Up to K3 | 2 | K1&K2 | 1 | K1 | 2 (K3&K3) | 1(K3) |
| 3 | CO3 | Up to K3 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K3) |
| 4 | CO4 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) |
| 5 | CO5 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) |
| No. of | Questions | s to be Asked | 10 | | 5 | | 10 | 5 |
| No.of Questions to be answered | | 10 | | 5 | | 5 | 3 | |
| Mar | Marks for each question | | 1 | | 2 | | 5 | 10 |
| Total N | Total Marks for each section | | | | 10 | | 25 | 30 |
| | (Figures | in parenthesi | is denotes, q | uestions s | hould be asl | sed with | the given K l | evel) |

| | Distribution of Marks with K Level | | | | | | |
|------------|--|---|-------------------------------------|-------------------------------|----------------|--------------------------------------|----------------|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % |
| K1 | 5 | 4 | - | - | 9 | 7.5 | 33 |
| K2 | 5 | 6 | 10 | 10 | 31 | 25.83 | |
| K3 | - | - | 40 | 20 | 60 | 50 | 50 |
| K4 | _ | - | - | 20 | 20 | 16.67 | 17 |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 |

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

| Section | A (Mu | ltiple Cho | ice Questions) |
|---------------|-------------------|------------------------|---|
| Answe | r All Q | uestions | (10x1=10 marks) |
| Q.No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| | | ort Answer | |
| | - | uestions | (5x2=10 marks) |
| Q.No | <u>CO</u> | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | $\frac{CO2}{CO2}$ | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 Section | $\frac{CO5}{C}$ | K2 | |
| | | her/Or Tyj uestions | $(5 \ge 5 = 25 \text{ marks})$ |
| Q.No | CO | K Level | Questions |
| 16) a | C01 | K2 | Questions |
| , | C01 | K2 K2 | |
| 16) b | | | |
| 17) a | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K3 | |
| 19) b | CO4 | K3 | |
| 20) a | CO5 | K3 | |
| 20) b | CO5 | K3 | |
| , | | | ormance of the students is to be assessed by attempting higher |
| level of | | | statunee of the statemes is to be assessed by attempting ingher |
| | | en Choice | |
| | | Three ques | |
| Q.No | CO | K Level | Questions |
| 21 | CO1 | K2 | |
| 22 | CO2 | K3 | |
| 23 | CO3 | K3 | |
| 24 | CO4 | K4 | |
| 25 | CO5 | K4 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | FUEL CHEMISTRY | | | | |
|---|--|--------------|--------|--------------|--|
| Course Code | 21UCHE63 | L | Р | С | |
| Category | CORE ELECTIVE | 5 | - | 5 | |
| Nature of cours | e: EMPLOYABILITY 🗸 SKILL ORIENTED 🖌 ENTREPREN | URS | HIP | \checkmark | |
| Course Objecti | ives: | | | | |
| • To Recall th | e knowledge of fuel sources and its types | | | | |
| • To Remember the types of solid fuels and its advantages and disadvantages | | | | | |
| _ | e the knowledge of solid, liquid, gaseous and bio fuels | | | | |
| | the petroleum and petrochemical fuels and its refining process | | | | |
| | ne the manufacture of fuels and catalysts used in petroleum industry | | | | |
| | ERGY SOURCES | | 15 | | |
| | gy sources: solar, wind and geothermal energy - bioenergy hydrope | | | | |
| | newable energy sources: fossil fuels and nuclear fuels - definition | | | | |
| | - calorific value - determination of calorific value - classification of | | | | |
| • | criterion for selection of fuel - properties: ignition temperature - flam | ie tem | perat | ure - | |
| flash point - fire | s point. LID FUELS | | 15 | | |
| | ial - industrial solid fuels - Coal: formation - properties - classification | | - | | |
| | verisation of coal - role of sulphur and ash in coal - analysis of coal: | | | | |
| | ntages and disadvantages of solid fuels - fractional distillation of co | | | | |
| coal tar-based c | | ui tui | ub | 05 01 | |
| | QUID FUELS | | 15 | | |
| | petrochemicals - refining of petroleum - composition and uses of a | main | petro | leum | |
| | king - thermal - catalytic cracking - advantages - octane rating - anti | | - | | |
| | l - cetane rating - antidiesel knock agents - hydrocarbons from | | | | |
| petrochemicals | - direct and indirect petrochemicals - catalysts used in petroleum indu | stry. | | | |
| Unit: IV GA | SEOUS FUELS | | 15 | | |
| | natural - artificial gaseous fuels - examples and their importanc | | | | |
| | semi water gas - LPG - manufacture - composition and uses - gob | ar ga | s - bi | ogas | |
| | ntages and disadvantages. | | | | |
| |) FUELS | | 15 | | |
| | rces and classification: biodiesel - bioethanol - hydrogen fuel from biodiesel - advantages of biofuels. | biom | ass - | uses | |
| | Total Lecture Ho | urs | 75 H | rs | |
| Books for Stud | | uis | 75 11 | 15 | |
| | , Industrial Chemistry, Goel Publishing House, 13th Edition, 2002. | | | | |
| | Jain, Engineering Chemistry, Dhanpat Rai Publishing Company (P) L | TD 1 | 6th | | |
| Edition, 20 | | <i>.</i> , 1 | oui | | |
| Books for Refe | | | | | |
| | batovskiy, Fuel Chemistry and Technology, LAMBERT Academic Pu | ıblishi | ng. 6 | th | |
| June 2013, India | | | 6, 0 | | |
| , | | | | | |

| Web R | Web Resources: | | | | | |
|----------------|---|------------|--|--|--|--|
| 1. <u>http</u> | s://en.m.wikipedia.org/wiki/Biofuels | | | | | |
| 2. <u>http</u> | s://www.studentenergy.org/topics/biofuels | | | | | |
| Course | e Outcomes | K Level | | | | |
| On th | On the completion of the course the student will be able to | | | | | |
| CO1: | Ability to remember the basic concepts of atoms, molecules, fuels, catalysis. | [Up to K2] | | | | |
| CO2: | Discuss the composition of the solutions and mixtures and type of catalysts. | [Up to K3] | | | | |
| CO3: | Interpret the knowledge of atoms, molecules, fuels and catalysts. | [Up to K3] | | | | |
| CO4: | : Examine the properties of metals and non-metals and role of catalysts. [Up to K4] | | | | | |
| CO5: | Distinguish between pure substance and mixtures, various types of catalysts. | [Up to K4] | | | | |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | |
|------------------------|--------------------------|-------------|-------------|------|-------------|-------------|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | |
| CO5 | 1 | 3 | 2 | 3 | 2 | 1 | | |
| Weightage | 10 | 10 | 10 | 11 | 9 | 11 | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| Unit | Course Name | Hrs | Pedagogy |
|------|--|-----|------------------------------------|
| Ι | ENERGY SOURCES Renewable energy sources: solar, wind and geothermal energy – bioenergy hydropower and ocean energy - non-renewable energy sources: fossil fuels and nuclear fuels - definition and examples - fuel - definition - calorific value - determination of calorific value - classification of fuels: primary and secondary - criterion for selection of fuel - properties: ignition temperature - flame temperature - flash point - fire point. | 15 | Chalk, Talk & Power point |
| II | SOLID FUELS Natural - artificial - industrial solid fuels - Coal: formation - properties - classification - coking - non coking and pulverisation of coal - role of sulphur and ash in coal - analysis of coal: proximate and ultimate - advantages and disadvantages of solid fuels - fractional distillation of coal tar - uses of coal tar-based chemicals. | 15 | Chalk, Talk & Power point |
| III | LIQUID FUELS Petroleum and petrochemicals - refining of petroleum - composition and uses of main petroleum fractions - cracking - thermal - catalytic cracking - advantages - octane rating - anti knock agents - unleaded petrol - cetane rating - antidiesel knock agents - hydrocarbons from petroleum - petrochemicals - direct and indirect petrochemicals - catalysts used in petroleum industry. | 15 | Chalk, Talk & Power point |
| IV | GASEOUS FUELS Classification: natural - artificial gaseous fuels - examples and their importance - water gas- producer gas - semi water gas - LPG - manufacture - composition and uses - gobar gas - biogas generation- advantages and disadvantages. | 15 | Chalk, Talk & Power point |
| V | BIO FUELS Definition - sources and classification: biodiesel - bioethanol - hydrogen fuel from biomass - uses manufacture of biodiesel - advantages of biofuels. | 15 | Chalk, Talk & Power point |

Course Designed by: Dr. A. J. Sunija & Dr. K. Muthupandi

| | | | ng Outcome I Formative E | xamination | - Blue Pri | nt | | | |
|---------------------|--------|---------------------------------|-----------------------------|--|--------------------------|----------------------------|----------------------------------|---------------------|--|
| | | Articulation | Sectio | Mapping – K Levels with Section A MCQs | | Section B Short Answers | | Section | |
| Inte rnal | Cos | K Level | No. of. Questions | Qs K – Level | No. of. Questi ons | K - Level | Section C Either or Choice | D Open Choice | |
| CI | CO1 | Up to K2 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | |
| AI | CO2 | Up to K3 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K3) | |
| CI | CO3 | Up to K3 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | |
| AII | CO4 | Up to K4 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K4) | |
| | | No. of Questions to be asked | 4 | | 3 | | 4 | 2 | |
| Question Pattern | | No. of Questions to be answered | 4 | | 3 | | 2 | 1 | |
| CIA | I & II | Marks for each question | 1 | | 2 | | 5 | 10 | |
| | | Total Marks for each section | 4 | | 6 | | 10 | 10 | |

| | Distribution of Marks with K Level CIA I & CIA II | | | | | | | |
|-----|---|--|---|--------------------------------------|----------------------------------|----------------|--------------------------------------|---------------------|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidate of % |
| | K1 | 2 | 2 | - | - | 4 | 8 | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 |
| CIA | K3 | - | - | 10 | 10 | 20 | 40 | 40 |
| I | K4 | - | - | - | - | - | - | - |
| - | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 |
| | K1 | 2 | 2 | - | - | 4 | 8 | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 |
| CIA | K3 | - | - | 10 | - | 10 | 20 | 20 |
| II | K4 | - | - | - | 10 | 10 | 20 | 20 |
| | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| S | Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs) | | | | | | | |
|--------------------------------|---|---------------|---------------------|--------------|------------------------|--------------|----------------------------|-------------------------------|
| | | | MCQs | | Short Ar | iswers | Section C | Castier D |
| S.No | COs | K - Level | No. of Questions | K – Level | No. of Questio n | K – Level | (Either / or Choice) | Section D (Open Choice) |
| 1 | CO1 | Up to K2 | 2 | K1,K2 | 1 | K1 | 2 (K2&K2) | 1(K2) |
| 2 | CO2 | Up to K3 | 2 | K1&K2 | 1 | K1 | 2 (K3&K3) | 1(K3) |
| 3 | CO3 | Up to K3 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K3) |
| 4 | CO4 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) |
| 5 | CO5 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) |
| No. of | Questions | s to be Asked | 10 | | 5 | | 10 | 5 |
| No.of Questions to be answered | | 10 | | 5 | | 5 | 3 | |
| Mar | ks for eac | h question | 1 | | 2 | | 5 | 10 |
| Total Marks for each section | | | 10 | | 10 | | 25 | 30 |
| | (Figures | in parenthesi | is denotes, qu | estions sh | nould be as | ked with | the given K | level) |

| | Distribution of Marks with K Level | | | | | | |
|------------|--|---|-------------------------------------|-------------------------------|----------------|--------------------------------------|----------------|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % |
| K1 | 5 | 4 | - | - | 9 | 7.5 | 33 |
| K2 | 5 | 6 | 10 | 10 | 31 | 25.83 | 33 |
| K3 | - | - | 40 | 20 | 60 | 50 | 50 |
| K4 | - | - | - | 20 | 20 | 16.67 | 17 |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 |

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

| Section | A (Mu | iltiple Cho | ice Questions) |
|----------|---------|-------------|--|
| Answei | r All Q | uestions | (10x1=10 marks) |
| Q.No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| Section | B (Sho | ort Answei | rs) |
| Answe | r All Q | uestions | (5x2=10 marks) |
| Q.No | CO | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| Section | C (Eit | her/Or Ty | pe) |
| Answei | r All Q | uestions | (5 x 5 = 25 marks) |
| Q.No | CO | K Level | Questions |
| 16) a | CO1 | K2 | |
| 16) b | CO1 | K2 | |
| 17) a | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K3 | |
| 19) b | CO4 | K3 | |
| 20) a | CO5 | K3 | |
| 20) b | CO5 | K3 | |
| | | | ormance of the students is to be assessed by attempting higher |
| level of | | | |
| | | en Choice | |
| | | Three ques | |
| Q.No | CO | K Level | Questions |
| 21 | CO1 | K2 | |
| 22 | CO2 | K3 | |
| 23 | CO3 | K3 | |
| 24 | CO4 | K4 | |
| 25 | CO5 | K4 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name NANO CHEMISTRY | | | | | | | | | | |
|--|--|---|---|--|---|---|---|--|--|--|
| Course Code | 21 | UCHE64 | 1 | | | | | L | Р | C |
| Category | C | CORE ELECTIVE5 | | | | | - | 5 | | |
| Nature of cour | se: | EMPLOY | YABILITY | </th <th>SKILL ORIENTED</th> <th>\checkmark</th> <th>ENTREPRI</th> <th>ENURS</th> <th>HIP</th> <th>✓</th> | SKILL ORIENTED | \checkmark | ENTREPRI | ENURS | HIP | ✓ |
| Course Object | tives | : | | | · | • | | | | |
| • To Underst | and | the basic | concept of | nan | omaterials and its type | s. | | | | |
| • To Identify | the | nanoparti | icles and its | s syr | nthetic methods of nane | oma | terials | | | |
| To Analyze | e the | classical | colloid the | ory | of nanomaterials | | | | | |
| To Perform | the | optical cl | haracteriza | tion | methods on prepared n | nano | materials | | | |
| To Determine | ine t | he applica | ation of na | noma | aterials and its environ | mer | ntal safety me | asures | | |
| Unit: IINTRODUCTION TO NANOCHEMISTRY15 | | | | | | | | | | |
| | | | | <u> </u> | ic Materials Chemis | • | | | | |
| | | - | | | tructures, Metal and so | emio | conductor nat | nocrysta | lls, Po | orous |
| inorganic nano | | | | | | | | | - <u>r</u> | |
| | | | | | NTHESIS | | | | 15 | |
| Carbon-based 1 | | particles | (carbon na | notu | ibes, grapheme), Poroi | is in | organic nano | particle | s. Org | ganic |
| (latexes) and | cark | | | | | | | | | |
| | | | nanoparti | cles | (carbon nanotubes, | gra | pheme). Bas | sic syn | hesis | |
| | hod | s for nano | nanoparti materials (| cles CVI | (carbon nanotubes, D, sol-gel, microemuls | gra | pheme). Bas | sic syn | hesis nal). | and |
| Unit: III CI | hod LAS | s for nano SICAL C | nanoparti materials (OLLOID | cles CVI TH | (carbon nanotubes, D, sol-gel, microemuls EORY | gra ion, | pheme). Bas template, hy | sic syn drotheri | hesis nal). 15 | and |
| Unit: IIICINucleationan | hod LAS d g | s for nano SICAL C rowth, C | nanoparti materials (OLLOID Ostwald rip | cles CVI TH | (carbon nanotubes, D, sol-gel, microemuls EORY ng, Homogeneous va | gra ion, s. h | pheme). Bas template, hy neterogeneous | sic synt drotheri s nucle | hesis nal). 15 ation | and i and |
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- 4. Edelstein.A.S and Cammarata.R.C, Nanomaterials- Synthesis, Properties and Applications, Institute of Physics Publishing, 1998, London.
- 5. Ozin.G and Arsenault. A, Nanochemistry: A Chemical Approach to Nanomaterials, RSC Publishing, 2005.

Web Resources:

- 1. <u>https://youtu.be/BLNwNkdRiTI</u>
- 2. https://youtu.be/LbVg58LfvJc
- 3. https://youtu.be/evE08ycZfnM
- 4. https://youtu.be/41zegz4APPs

| Course | Course Outcomes | | | | | | |
|-------------|---|------------|--|--|--|--|--|
| On th | On the completion of the course the student will be able to | | | | | | |
| CO1: | D1: Define nanomaterials and its types of nanomaterials | | | | | | |
| CO2: | Understand the nanoparticles and synthetic methods of nanomaterials | [Up to K3] | | | | | |
| CO3: | Analyze the classical colloid theory on nanomaterials | [Up to K3] | | | | | |
| CO4: | Interpret the optical characterization of prepared nanomaterials | [Up to K4] | | | | | |
| CO5: | Distinguish the application of nanomaterials | [Up to K4] | | | | | |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | | |
|-----------------|--------------------------|-------------|------|------|-------------|-------------|--|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | | |
| CO5 | 1 | 3 | 2 | 3 | 2 | 1 | | | |
| Weightage | 10 | 10 | 10 | 11 | 9 | 11 | | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| Unit | Course Name | Hrs | Pedagogy |
|------|--|-----|------------------------------------|
| Ι | INTRODUCTION TO NANOMATERIALS Nanomaterials – Definition – Inorganic Materials Chemistry and Nanochemistry; Basics Nanomaterials. Types, compositions, and structures, Metal and semiconductor nanocrystals, Porous inorganic nanoparticles, Organic (latexes). | 15 | Chalk, Talk & Power point |
| II | NANOPARTICLS AND SYNTHESIS Carbon-based nanoparticles (carbon nanotubes, grapheme), Porous inorganic nanoparticles, Organic (latexes) and carbon-based nanoparticles (carbon nanotubes, grapheme). Basic synthesis and fabrication methods for nanomaterials (CVD, sol-gel, microemulsion, template, hydrothermal). | 15 | Chalk, Talk & Power point |
| ш | CLASSICAL COLLOID THEORY Nucleation and growth, Ostwald ripening, Homogeneous vs. heterogeneous nucleation and applications of nanomaterials, Anisotropic growth and shape control, catalyzed (seeded) growth, Nanocrystal doping, solid solutions and Vegard's rule. | 15 | Chalk, Talk & Power point |
| IV | OPTICAL CHARACTERIZATION Absorption and photoluminescence (PL & PLE) spectroscopies, steady- state vs. fast spectroscopy, dynamic light scattering, Structural characterization: XRD, TEM, AFM, Deviations between bulk and near- surface crystal structures. | 15 | Chalk, Talk & Power point |
| v | CHEMISTRY OF SMALL SURFACES Curvature and neighboring-charge effects on chemical reactivity and equilibria (pKa's, redox potentials), Applications in structural materials, lighting, energy conversion (Solar Cells) and catalysis applications, Environmental, safety and ethical aspects of nanotechnology. | 15 | Chalk, Talk & Power point |

Course Designed by: Dr. K. Muthupandi & Dr. V. Ramasamy Raja

| | Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs) | | | | | | | | | | |
|---------------------|--|---------------------------------|----------------------|--------------|--------------------------|-----------------|---------------------|---------------------|--|--|--|
| Inte | | | | ion A CQs | | on B Answers | Section C | Section D | | | |
| rnal | Cos | K Level | No. of. Questions | K – Level | No. of. Question s | K - Level | Either or Choice | D Open Choice | | | |
| CI | CO1 | Up to K2 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | |
| AI | CO2 | Up to K3 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K3) | | | |
| CI | CO3 | Up to K3 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | |
| AII | CO4 | Up to K4 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K4) | | | |
| | | No. of Questions to be asked | 4 | | 3 | | 4 | 2 | | | |
| Question Pattern | | No. of Questions to be answered | 4 | | 3 | | 2 | 1 | | | |
| CIA | I & II | Marks for each question | 1 | | 2 | | 5 | 10 | | | |
| | | Total Marks for each section | 4 | | 6 | | 10 | 10 | | | |

| | Distribution of Marks with K Level CIA I & CIA II | | | | | | | | | | | |
|-----|---|---|--|----|-------------------------------|----------------|--------------------------------------|----------------------|--|--|--|--|
| | K (Multiple Level Choice Questions) | | Section BSection C(Short(Either /AnswerOrQuestions)Choice) | | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidat e of % | | | | |
| | K1 | 2 | 2 | - | - | 4 | 8 | | | | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 | | | | |
| CIA | K3 | - | - | 10 | 10 | 20 | 40 | 40 | | | | |
| I | K4 | - | - | - | - | - | - | - | | | | |
| - | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 | | | | |
| | K1 | 2 | 2 | - | - | 4 | 8 | | | | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 | | | | |
| CIA | K3 | - | - | 10 | - | 10 | 20 | 20 | | | | |
| II | K4 | - | - | - | 10 | 10 | 20 | 20 | | | | |
| | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 | | | | |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| S | ummativ | ve Examination | | | - | ping – K | Level with Co | ourse |
|---------|---------------------|-------------------|--------------------|------------|--------------|-----------------|----------------|---------|
| | | | (| Dutcomes | (COs) | | | |
| | S.No COs | | MC | Qs | Short An | swers | Section C | Section |
| S.No | | K - Level | No. of Question | K – | No. of | K – | (Either / or | D (Open |
| | | | S | Level | Question | Level | Choice) | Choice) |
| 1 | CO1 | Up to K2 | 2 | K1,K2 | 1 | K1 | 2 (K2&K2) | 1(K2) |
| 2 | CO2 | Up to K3 | 2 | K1&K2 | 1 | K1 | 2 (K3&K3) | 1(K3) |
| 3 | CO3 | Up to K3 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K3) |
| 4 | CO4 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) |
| 5 | CO5 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) |
| No. of | Question | s to be Asked | 10 | | 5 | | 10 | 5 |
| No | of Questi. answe | ions to be red | 10 | | 5 | | 5 | 3 |
| Mar | ks for eac | ch question | 1 | | 2 | | 5 | 10 |
| Total N | Marks for | each section | 10 | | 10 | | 25 | 30 |
| | (Figures | in parenthesi | is denotes, q | uestions s | hould be asl | ked with | the given K le | vel) |

| | Distribution of Marks with K Level | | | | | | | | | | |
|------------|---|----|---|----|----------------|--------------------------------------|-------------------|--|--|--|--|
| K Level | Section ASection B(Multiple(ShortChoiceAnswerQuestions)Questions) | | Section C (Either/ or Choice)Section D (Open | | Total Marks | % of (Marks without choice) | Consolidated % | | | | |
| K1 | 5 | 4 | - | - | 9 | 7.5 | 33 | | | | |
| K2 | 5 | 6 | 10 | 10 | 31 | 25.83 | 55 | | | | |
| K3 | - | - | 40 | 20 | 60 | 50 | 50 | | | | |
| K4 | _ | - | - | 20 | 20 | 16.67 | 17 | | | | |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 | | | | |

NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.

| Section | A (Mu | Itiple Cho | ice Questions) |
|----------|----------|------------|--|
| Answei | r All Qu | uestions | (10x1=10 marks) |
| Q.No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| Section | B (Sho | ort Answei | rs) |
| Answei | r All Qu | uestions | (5x2=10 marks) |
| Q.No | СО | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| Section | C (Eit | her/Or Ty | pe) |
| Answer | r All Qu | uestions | (5 x 5 = 25 marks) |
| Q.No | CO | K Level | Questions |
| 16) a | CO1 | K2 | |
| 16) b | CO1 | K2 | |
| 17) a | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K3 | |
| 19) b | CO4 | K3 | |
| 20) a | CO5 | K3 | |
| 20) b | CO5 | K3 | |
| | | | ormance of the students is to be assessed by attempting higher |
| level of | | | |
| | | en Choice | |
| | | Three ques | |
| Q.No | CO | K Level | Questions |
| 21 | CO1 | K2 | |
| 22 | CO2 | K3 | |
| 23 | CO3 | K3 | |
| 24 | CO4 | K4 | |
| 25 | CO5 | K4 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | CLINICAL AND MEDICINAL CHEMISTRY | | | |
|---|--|--------|---------|--------------|
| Course Code | 21UCHE65 | L | Р | С |
| Category | CORE ELECTIVE | 5 | - | 5 |
| Nature of cours | e: EMPLOYABILITY 🗸 SKILL ORIENTED 🖌 ENTREPREN | URS | HIP | \checkmark |
| Course Object | ives: | | | |
| • To Recall the | e definitions of health, sterilization of surgical instrument and biocher | nical | analy | /sis. |
| | per the concept of drugs and learn the manufacture of common drugs. | | | |
| - | e the enzymes and its classification. | | | |
| | the concept of blood volume, blood group and coagulation of blood. | | | |
| | ne the knowledge on heredity and recombinant DNA and its possible h | azaro | 1 | |
| | INICAL HYGIENE AND BIOCHEMICAL ANALYSIS | | 15 | |
| | ealth, Sterilization of surgical instruments, disinfectants, antiseptics a | | | |
| | alysis of urine, serum and fecal matter. Treatment for specific poisons | s-acic | ls, all | calis, |
| | cury compounds. | | 1.5 | , |
| | MMON TESTING OF DRUGS | 1. | 15 | |
| | drugs (e.g. quinine, reserpine, atopside and d – tubocurarine) from In | | | |
| | of drugs: biological variation – screening and toxicity – Use of pha | | _ | |
| | ex – Types of drugs and their modes of action – Depressant drugs (sp d hypnotics) – Anticonvulsant drugs (sodium valproate, hydantoin | | | |
| | ne (glyceryl guaiacolate, diazepam). Cardiovascular drugs-nitrates, | | | |
| | d atenolol) and calcium channel blockers. | Deta | | LICI S |
| | ZYMES | | 15 | |
| | pecificity – factors influencing enzymes – Coenzymes – Cofactor, AT | ΓΡΝ | - | |
| | n and Immobilization of enzymes. Applications of enzymes. | , | leena | 1115111 |
| | DY FLUID | | 15 | |
| | blood groups, coagulation of blood. Plasma lipoproteins. B | lood | - | |
| | , diseases affecting red cells: Hyperchromic and hypochromic a | | | |
| | od sugar and diabetes. | | | |
| Unit: V BI | DTECHNOLOGY | | 15 | |
| | mbinant DNA, Genetic engineering and its possible hazards, G | Gene | spli | cing, |
| | interferon and human insulin (Humulin), Drug manufacture based o | | | |
| (only antibiotics | | | | |
| | Total Lecture Hou | ırs | 75 H | rs |
| Books for Stud | y: | | | |
| 1. Jayashree C | hosh, A Textbook of Pharmaceutical Chemistry, S. Chand & Co., New | v Del | hi, 19 | 999. |
| | C, Biochemistry, Tata McGraw Hill Publishing Co., 1993. | | , - | |
| | ar, Medicinal Chemistry, Wiley Eastern Ltd., 1993, New Delhi. | | | |
| Books for Refe | | | | |
| 1. Le Roy, O, | Natural and Synthetic Organic Medicinal Compounds, Ealemi, 1976. | | | |
| | Hawk's Physiological Chemistry, 14th Edition, Tata McGraw Hill F | Publis | hing | Co |
| 1 . 00001, D . L , | Hawk's Thysiological Chemistry, 11 Eatlon, Tata McOlaw Thirt | uomo | mig | 00., |

| 3. Kle | 3. Kleiner. O and Martin. J, Biochemistry, Prentice-Hall of India, 1974, New Delhi. | | | | | | |
|---------------|---|------------|--|--|--|--|--|
| Web F | Resources: | | | | | | |
| 1. <u>htt</u> | os://youtu.be/IUxkcEoGkVg | | | | | | |
| 2. htt | os://youtu.be/pss_sm2zaek | | | | | | |
| 3. htt | os://youtu.be/Z63xnlDNajE | | | | | | |
| 4. htt | os://youtu.be/qaYBUz14B3w | | | | | | |
| Course | e Outcomes | K Level | | | | | |
| On th | e completion of the course the student will be able to | | | | | | |
| CO1: | Remember the basic definitions of clinical hygiene and biochemical analysis. | [Up to K2] | | | | | |
| CO2: | Discuss the manufacture of common drugs from medicinal plants and type of drugs. | [Up to K3] | | | | | |
| CO3: | Interpret the knowledge of enzymes and its classification | [Up to K3] | | | | | |
| CO4: | Examine the properties of blood volume, blood group and coagulation of blood. | [Up to K4] | | | | | |
| CO5: | Determine the heredity and recombinant DNA and its possible hazards. | [Up to K4] | | | | | |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | |
|------------------------|--------------------------|------|------|------|------|-------------|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | |
| CO5 | 1 | 3 | 2 | 3 | 2 | 1 | | |
| Weightage | 10 | 10 | 10 | 11 | 9 | 11 | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

| Unit | Course Name | Hrs | Pedagogy |
|------|---|-----|------------------------------------|
| I | CLINICAL HYGIENE AND BIOCHEMICAL ANALYSIS Definition of health, Sterilization of surgical instruments, disinfectants, antiseptics and Sanitation. Biochemical analysis of urine, serum and fecal matter. Treatment for specific poisons-acids, alkalis, arsenic and mercury compounds. | 15 | Chalk, Talk & Power point |
| II | COMMON TESTING OF DRUGS Manufacture of drugs (e.g. quinine, reserpine, atopside and d – tubocurarine) from Indian medicinal plants. Testing of drugs: biological variation – screening and toxicity – Use of pharmacopeia and therapeutic index – Types of drugs and their modes of action – Depressant drugs (special reference to sedatives and hypnotics) – Anticonvulsant drugs (sodium valproate, hydantoins) – Acting at spinal cord alone (glyceryl guaiacolate, diazepam). Cardiovascular drugs- nitrates, beta blockers (propranolol and atenolol) and calcium channel blockers. | 15 | Chalk, Talk & Power point |
| III | ENZYMES Classification, specificity – factors influencing enzymes – Coenzymes – Cofactor, ATP, Mechanism of enzyme action and Immobilization of enzymes. Applications of enzymes. | 15 | Chalk, Talk & Power point |
| IV | BODY FLUID Blood volume, blood groups, coagulation of blood. Plasma lipoproteins. Blood pressure Arteriosclerosis, diseases affecting red cells: Hyperchromic and hypochromic anemia. Blood transfusion. Blood sugar and diabetes. | 15 | Chalk, Talk & Power point |
| V | BIOTECHNOLOGY Heredity, recombinant DNA, Genetic engineering and its possible hazards, Gene splicing, manufacture of interferon and human insulin (Humulin), Drug manufacture based on fermentation (only antibiotics) | 15 | Chalk, Talk & Power point |

Course Designed by: Dr. R. Satheesh & Dr. K. Muthupandi

| | | | ng Outcome I Formative E Mapping – K | Examination | - Blue Print | t | | |
|------------|----------------|---------------------------------|--|--------------|--------------------------|-----------|---------------------|----------------|
| | | | | Section A | | Section B | | Sectio |
| Inte | C | T7 T 1 | MC | Qs | | Answers | Section C | n D |
| rnal | Cos | K Level | No. of. Questions | K – Level | No. of. Question s | K - Level | Either or Choice | Open Choice |
| CI | CO1 | Up to K2 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) |
| AI | CO2 | Up to K3 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K3) |
| CI | CO3 | Up to K3 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) |
| AII | CO4 | Up to K4 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K4) |
| | | No. of Questions to be asked | 4 | | 3 | | 4 | 2 |
| • | estion tern | No. of Questions to be answered | 4 | | 3 | | 2 | 1 |
| CIA I & II | | Marks for each question | 1 | | 2 | | 5 | 10 |
| | | Total Marks for each section | 4 | | 6 | | 10 | 10 |

| | Distribution of Marks with K Level CIA I & CIA II | | | | | | | | | |
|-----|---|--|---|--------------------------------------|-------------------------------|----------------|--|---------------------|--|--|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Mar ks with out choic e) | Consolidate of % | | |
| | K1 | 2 | 2 | - | - | 4 | 8 | | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 | | |
| CIA | K3 | - | - | 10 | 10 | 20 | 40 | 40 | | |
| I | K4 | - | - | - | - | - | - | - | | |
| - | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 | | |
| | K1 | 2 | 2 | - | - | 4 | 8 | | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 | | |
| CIA | K3 | - | - | 10 | - | 10 | 20 | 20 | | |
| II | K4 | - | - | - | 10 | 10 | 20 | 20 | | |
| | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 | | |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| Summ | Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs) | | | | | | | | | |
|------------------------------|--|-----------------|-----------------|-------------|---------------|------------|----------------|-----------|--|--|
| | | | MC | Qs | Short An | swers | Section C | Section D | | |
| S.No | COs | K - Level | No. of | K – | No. of | K – | (Either / | (Open | | |
| | | | Questions | Level | Question | Level | or Choice) | Choice) | | |
| 1 | CO1 | Up to K2 | 2 | K1,K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | |
| 2 | CO2 | Up to K3 | 2 | K1&K2 | 1 | K1 | 2 (K3&K3) | 1(K3) | | |
| 3 | CO3 | Up to K3 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K3) | | |
| 4 | CO4 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | | |
| 5 | CO5 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | | |
| No. of | Questions | s to be Asked | 10 | | 5 | | 10 | 5 | | |
| No | No.of Questions to be answered | | 10 | | 5 | | 5 | 3 | | |
| Marks for each question | | 1 | | 2 | | 5 | 10 | | | |
| Total Marks for each section | | 10 | | 10 | | 25 | 30 | | | |
| | (Figu | res in parenthe | esis denotes, o | questions s | hould be aske | ed with th | e given K leve | el) | | |

| | Distribution of Marks with K Level | | | | | | | | | |
|------------|--|---|-------------------------------------|-------------------------------|----------------|--------------------------------------|----------------|--|--|--|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % | | | |
| K1 | 5 | 4 | - | - | 9 | 7.5 | 33 | | | |
| K2 | 5 | 6 | 10 | 10 | 31 | 25.83 | 55 | | | |
| K3 | - | - | 40 | 20 | 60 | 50 | 50 | | | |
| K4 | - | - | - | 20 | 20 | 16.67 | 17 | | | |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 | | | |
| | NB: Higher level of performance of the students is to be assessed by attempting higher level | | | | | | | | | |
| of K lev | els. | | | | | | | | | |

| Section | A (Mu | ultiple Cho | ice Questions) |
|----------|---------|-------------|--|
| | | Juestions | (10x1=10 marks) |
| Q.No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| Section | B (Sho | ort Answei | rs) |
| Answe | r All Q | uestions | (5x2=10 marks) |
| Q.No | CO | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| Section | C (Eit | her/Or Ty | pe) |
| Answe | r All Q | uestions | (5 x 5 = 25 marks) |
| Q.No | CO | K Level | Questions |
| 16) a | CO1 | K2 | |
| 16) b | CO1 | K2 | |
| 17) a | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K3 | |
| 19) b | CO4 | K3 | |
| 20) a | CO5 | K3 | |
| 20) b | CO5 | K3 | |
| | | | ormance of the students is to be assessed by attempting higher |
| level of | | | <u></u> |
| | | en Choice | |
| | - | Three ques | |
| Q.No | CO | K Level | Questions |
| 21 | CO1 | K2 | |
| 22 | CO2 | K3 | |
| 23 | CO3 | K3 | |
| 24 | CO4 | K4 | |
| 25 | CO5 | K4 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| urse Code21UCHE66LPtegoryCORE ELECTIVE5-ure of course:EMPLOYABILITY \checkmark SKILL ORIENTED \checkmark ENTREPRENURSHIPurse Objectives: \checkmark SKILL ORIENTED \checkmark ENTREPRENURSHIParse Objectives:To Recall the basic concept of electrochemical cells and electrodesTo Remember the electrolytes and determine of activity coefficients of electrolytesTo Interpret the electrodes and energy conservationTo Perform the basic components of electroplating and metal finishingTo Determine the electrochemical properties on corrosion scienceit: IELECTROMOTIVE FORCEIf and Equilibrium constant (K) of a cell reaction - Nernst equation - concentration cells without transference - electrolyte concentration cells without | C 5 ✓ |
|---|-----------------------|
| ure of course: EMPLOYABILITY ✓ SKILL ORIENTED ✓ ENTREPRENURSHIP urse Objectives: To Recall the basic concept of electrochemical cells and electrodes To Remember the electrolytes and determine of activity coefficients of electrolytes To Interpret the electrodes and energy conservation To Perform the basic components of electroplating and metal finishing To Determine the electrochemical properties on corrosion science 15 It: I ELECTROMOTIVE FORCE 15 IF and Equilibrium constant (K) of a cell reaction - Nernst equation - concentration cells without transference - electrolyte concentration cells without 15 | - |
| urse Objectives: To Recall the basic concept of electrochemical cells and electrodes To Remember the electrolytes and determine of activity coefficients of electrolytes To Interpret the electrodes and energy conservation To Perform the basic components of electroplating and metal finishing To Determine the electrochemical properties on corrosion science it: I ELECTROMOTIVE FORCE IF and Equilibrium constant (K) of a cell reaction - Nernst equation - concentration cells without transference - electrolyte concentration cells without | ✓ |
| To Recall the basic concept of electrochemical cells and electrodes To Remember the electrolytes and determine of activity coefficients of electrolytes To Interpret the electrodes and energy conservation To Perform the basic components of electroplating and metal finishing To Determine the electrochemical properties on corrosion science it: I ELECTROMOTIVE FORCE IF and Equilibrium constant (K) of a cell reaction - Nernst equation - concentration cells without transference - electrolyte concentration cells without | |
| To Remember the electrolytes and determine of activity coefficients of electrolytes To Interpret the electrodes and energy conservation To Perform the basic components of electroplating and metal finishing To Determine the electrochemical properties on corrosion science it: I ELECTROMOTIVE FORCE IF and Equilibrium constant (K) of a cell reaction - Nernst equation - concentration cells without transference - electrolyte concentration cells without | |
| To Interpret the electrodes and energy conservation To Perform the basic components of electroplating and metal finishing To Determine the electrochemical properties on corrosion science it: I ELECTROMOTIVE FORCE IF and Equilibrium constant (K) of a cell reaction - Nernst equation - concentration cells without transference - electrolyte concentration cells without | |
| To Perform the basic components of electroplating and metal finishing To Determine the electrochemical properties on corrosion science it: I ELECTROMOTIVE FORCE IF and Equilibrium constant (K) of a cell reaction - Nernst equation - concentration cells without transference - electrolyte concentration cells without | |
| To Determine the electrochemical properties on corrosion scienceit: IELECTROMOTIVE FORCE15IF and Equilibrium constant (K) of a cell reaction - Nernst equation - concentration cells without transference - electrolyte concentration cells | |
| it: I ELECTROMOTIVE FORCE 15 IF and Equilibrium constant (K) of a cell reaction - Nernst equation - concentration cells without transference - electrolyte | |
| IF and Equilibrium constant (K) of a cell reaction - Nernst equation - concentration concentration cells without transference - electrolyte concentration cells without | |
| ctrode concentration cells without transference - electrolyte concentration cells wi | 5 |
| | |
| | |
| nsference - concentration cells with transference - liquid junction potential (ELJP), electronic e electronic | rolyt |
| centrations cells with salt bridge - application of EMF measurements. | |
| it: II ELECTROLYTES, ELECTRODES AND ENERGY CONSERVATION 15 | 5 |
| ctrolytes – Determination of activity coefficients of electrolyte - determination of tran | - |
| nber - determination of pH of a solution using hydrogen electrode, quine hydrone electrode | - |
| ss electrode - potentiometric titrations. Energy Conservation: principals of energy conservation | |
| ctrochemical energy conservation - thermodynamic reversibility - Gibb [*] s equation. | LIOII |
| it: III ELCTROPLATING AND FUEL CELLS 15 | 5 |
| ctroplating – definition – factors affecting electroplating – components of electroplating pr | - |
| vorking process of electroplating – basic applications of electroplating – pocket plates | |
| tered plates - vented and sealed maintenance free designs – fuel cells -introduction, types o | |
| ls, advantages - photo electrochemical cells. | 1 100 |
| it: IV ENDUSTRIAL METAL FINISHING 15 | 5 |
| roduction - objectives of electroplating - characteristics of electrodeposit and factors - co | - |
| ctroplating - alkaline and acid bath - chromium electroplating - zinc electroplating - gold pla | |
| dizing and electroforming. | |
| it: V CORROSION SCIENCE 15 | 5 |
| roduction - types of corrosion - theories of corrosion - mechanism of corrosion - dry corros | - |
| ctrochemical corrosion - types - passivity - factors influencing rate of corrosion - nature of r | |
| vironment - phorbaix diagram - corrosion control techniques - inhibitors - cathodic prote | |
| thods - corrosion monitoring techniques. | |
| Total Lecture Hours 75 H | Irs |
| oks for Study: | |
| B.R. Puri, L.R. Sharma, Madan. S Pathaniya and B.S. Lark, Graduate of physical Chemistry | |
| (Volume II), Vishal Publishing Co. | |
| Bard & Faulkner, Electrochemical Methods: Fundamentals and Applications, Second edition | |
| oks for References: | ۱. |

- 1. Fritz Scholz, Electroanalytical Methods Guide to Experiments and Applications, 2nd Ed, Springer-Verlag Berlin Heidelberg 2010.
- 2. Joseph Wang, Analytical Electrochemistry, third edition 2006, John Wiley & Sons.

Web Resources:

- 1. https://youtu.be/rHMZ1Dpk5Fc
- 2. https://youtu.be/fHfv41HmIK0
- 3. https://youtu.be/BECSYfYhJGk
- 4. https://youtu.be/fM8hwkW8bIw
- 5. https://youtu.be/tJj-ilJTo6Y
- 6. https://youtu.be/uHoKGy704jk
- 7. https://youtu.be/4swtYzEbl64
- 8. https://youtu.be/q9c3-8CE_ro **C**-----

| Cours | e Outcomes | K Level | | | | | | |
|-------------|---|------------|--|--|--|--|--|--|
| On th | On the completion of the course the student will be able to | | | | | | | |
| CO1: | Remember the basic concepts of electrochemical cells and electrodes | [Up to K2] | | | | | | |
| CO2: | Discuss the electrolytes, electrodes and energy conservation | [Up to K3] | | | | | | |
| CO3: | Interpret the knowledge of electroplating and fuel cells | [Up to K3] | | | | | | |
| CO4: | Examine the objective and characteristics of metal finishing | [Up to K4] | | | | | | |
| CO5: | Analyze the electrochemical properties on corrosion science | [Up to K4] | | | | | | |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | |
|-----------------|--------------------------|-------------|-------------|------|-------------|-------------|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | |
| CO5 | 1 | 3 | 2 | 3 | 2 | 1 | |
| Weightage | 10 | 10 | 10 | 11 | 9 | 11 | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

V I

LESSON PLAN

| Unit | Course Name | Hrs | Pedagogy |
|------|--|-----|------------------------------------|
| I | ELECTROMOTIC FORCE EMF and Equilibrium constant (K) of a cell reaction - Nernst equation - concentration cells - electrode concentration cells without transference - electrolyte concentration cells without transference - concentration cells with transference - liquid junction potential (ELJP), electrolyte concentrations cells with salt bridge - application of EMF measurements. | 15 | Chalk, Talk & Power point |
| II | ELECTROLYTES,ELECTRODESANDENERGYCONSERVATIONElectrolytes - Determination of activity coefficients of electrolyte -determination of transport number - determination of pH of a solutionusing hydrogen electrode, quine hydrone electrode and glass electrode -potentiometric titrations. Energy Conservation: principals of energyconservation - electrochemical energy conservation - thermodynamicreversibility - Gibb"s equation. | 15 | Chalk, Talk & Power point |
| III | ELECTROPLATING AND FUEL CELLS Electroplating – definition – factors affecting electroplating – components of electroplating process – working process of electroplating – basic applications of electroplating – pocket plates and sintered plates - vented and sealed maintenance free designs – fuel cells - introduction, types of fuel cells, advantages - photo electrochemical cells. | 15 | Chalk, Talk & Power point |
| IV | INDUSTRIAL METAL FINISHING Introduction - objectives of electroplating - characteristics of electrodeposit and factors - copper electroplating - alkaline and acid bath - chromium electroplating - zinc electroplating - gold plating - anodizing and electroforming. | 15 | Chalk, Talk & Power point |
| V | CORROSION SCIENCE Introduction - types of corrosion - theories of corrosion - mechanism of corrosion - dry corrosion - electrochemical corrosion - types - passivity - factors influencing rate of corrosion - nature of metal, environment - phorbaix diagram - corrosion control techniques - inhibitors - cathodic protection methods - corrosion monitoring techniques. | 15 | Chalk, Talk & Power point |

Course Designed by: Dr. K. Muthupandi & Dr. R. Satheesh

| | Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs) | | | | | | | | | | |
|--------------|--|---------------------------------|---------------------|-------------------|----------------------|----------------------------|----------------------------------|---------------------|--|--|--|
| | | | | Section A MCQs | | Section B Short Answers | | Section | | | |
| Inte rnal | Cos | K Level | No. of. Question | K – Level | No. of. Questions | K - Level | Section C Either or Choice | D Open Choice | | | |
| CI | CO1 | Up to K2 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | |
| AI | CO2 | Up to K3 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K3) | | | |
| CI | CO3 | Up to K3 | 2 | K1 & K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | | | |
| AII | CO4 | Up to K4 | 2 | K1 & K2 | 2 | K2 & K2 | 2 (K3&K3) | 1(K4) | | | |
| | | No. of Questions to be asked | 4 | | 3 | | 4 | 2 | | | |
| - | estion tern | No. of Questions to be answered | 4 | | 3 | | 2 | 1 | | | |
| CIA | I & II | Marks for each question | 1 | | 2 | | 5 | 10 | | | |
| | | Total Marks for each section | 4 | | 6 | | 10 | 10 | | | |

| | Distribution of Marks with K Level CIA I & CIA II | | | | | | | | |
|-----|---|--|---|---|-------------------------------|----------------|--|---------------------|--|
| | K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either / Or Choice) | Section D (Open Choice) | Total Marks | % of (Mark s withou t choice) | Consolidate of % | |
| | K1 | 2 | 2 | - | - | 4 | 8 | 60 | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 00 | |
| CIA | K3 | - | - | 10 | 10 | 20 | 40 | 40 | |
| I | K4 | - | - | - | - | - | - | - | |
| - | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 | |
| | K1 | 2 | 2 | - | - | 4 | 8 | | |
| | K2 | 2 | 4 | 10 | 10 | 26 | 52 | 60 | |
| CIA | K3 | - | - | 10 | - | 10 | 20 | 20 | |
| II | K4 | - | - | - | 10 | 10 | 20 | 20 | |
| | Marks | 4 | 6 | 20 | 20 | 50 | 100 | 100 | |

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

| Summ | Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs) | | | | | | | | |
|------------------------------|--|---------------|-----------|-------|----------|-------|--------------|-----------|--|
| | | | MCQs | | Short An | swers | Section C | Section D | |
| S.No | COs | K - Level | No. of | K – | No. of | K – | (Either / or | (Open | |
| | | | Questions | Level | Question | Level | Choice) | Choice) | |
| 1 | CO1 | Up to K2 | 2 | K1,K2 | 1 | K1 | 2 (K2&K2) | 1(K2) | |
| 2 | CO2 | Up to K3 | 2 | K1&K2 | 1 | K1 | 2 (K3&K3) | 1(K3) | |
| 3 | CO3 | Up to K3 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K3) | |
| 4 | CO4 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | |
| 5 | CO5 | Up to K4 | 2 | K1&K2 | 1 | K2 | 2 (K3&K3) | 1(K4) | |
| No. of | Questions | s to be Asked | 10 | | 5 | | 10 | 5 | |
| No | No.of Questions to be answered | | 10 | | 5 | | 5 | 3 | |
| Marks for each question | | 1 | | 2 | | 5 | 10 | | |
| Total Marks for each section | | 10 | | 10 | | 25 | 30 | | |
| | (Figures in parenthesis denotes, questions should be asked with the given K level) | | | | | | | | |

| | Distribution of Marks with K Level | | | | | | | | |
|---------------------|--|---|-------------------------------------|-------------------------------|----------------|--------------------------------------|-------------------|--|--|
| K Level | Section A (Multiple Choice Questions) | Section B (Short Answer Questions) | Section C (Either/ or Choice) | Section D (Open Choice) | Total Marks | % of (Marks without choice) | Consolidated % | | |
| K1 | 5 | 4 | - | - | 9 | 7.5 | 33 | | |
| K2 | 5 | 6 | 10 | 10 | 31 | 25.83 | 55 | | |
| K3 | - | - | 40 | 20 | 60 | 50 | 50 | | |
| K4 | - | - | - | 20 | 20 | 16.67 | 17 | | |
| Marks | 10 | 10 | 50 | 50 | 120 | 100 | 100 | | |
| NB: Hig of K lev | · | erformance o | f the students | s is to be asse | essed by a | ttempting | higher level | | |

| Section | A (Mu | Itiple Cho | ice Questions) |
|----------|---------|------------|---|
| Answei | r All Q | uestions | (10x1=10 marks) |
| Q.No | CO | K Level | Questions |
| 1 | CO1 | K1 | |
| 2 | CO1 | K2 | |
| 3 | CO2 | K1 | |
| 4 | CO2 | K2 | |
| 5 | CO3 | K1 | |
| 6 | CO3 | K2 | |
| 7 | CO4 | K1 | |
| 8 | CO4 | K2 | |
| 9 | CO5 | K1 | |
| 10 | CO5 | K2 | |
| Section | B (Sho | ort Answei | rs) |
| Answei | r All Q | uestions | (5x2=10 marks) |
| Q.No | CO | K Level | Questions |
| 11 | CO1 | K1 | |
| 12 | CO2 | K1 | |
| 13 | CO3 | K2 | |
| 14 | CO4 | K2 | |
| 15 | CO5 | K2 | |
| Section | C (Eit | her/Or Ty | pe) |
| Answei | r All Q | uestions | (5 x 5 = 25 marks) |
| Q.No | CO | K Level | Questions |
| 16) a | CO1 | K2 | |
| 16) b | CO1 | K2 | |
| 17) a | CO2 | K3 | |
| 17) b | CO2 | K3 | |
| 18) a | CO3 | K3 | |
| 18) b | CO3 | K3 | |
| 19) a | CO4 | K3 | |
| 19) b | CO4 | K3 | |
| 20) a | CO5 | K3 | |
| 20) b | CO5 | K3 | |
| | | | formance of the students is to be assessed by attempting higher |
| level of | | | |
| | | en Choice | |
| | | Three ques | |
| Q.No | CO | K Level | Questions |
| 21 | CO1 | K2 | |
| 22 | CO2 | K3 | |
| 23 | CO3 | K3 | |
| 24 | CO4 | K4 | |
| 25 | CO5 | K4 | |

Summative Examinations - Question Paper – Format



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS) DEPARTMENT OF CHEMISTRY (For those who joined in 2021-2022 and after)

| Course Name | PO | LYMER | | | | | | | | |
|--|--|--|--|--|---|---|--|--|--|---|
| Course Code | 210 | JCHS61 | | | | | | L | Р | C |
| Category | SKILL | | | | | | | 2 | - | 2 |
| Nature of cour | se: E | MPLOY | ABILITY | \checkmark | SKILL ORIENTED | \checkmark | ENTREPRE | NURS | HIP | \checkmark |
| Course Object | ives: | | | | | | · | | | |
| • To Recall t | he co | ncept of p | olymeriza | tior | n and its classification a | and | stereochemist | ry | | |
| • To Remem | ber th | e types of | f polymeri | zati | ions and its techniques | | | | | |
| | | | | | ature and its associated | l pro | operties | | | |
| | | | | | thods of polymers | | | | | |
| To Analyze | | | | | | | | | | |
| | | | PT OF PC | | | | | | 06 | |
| | | | | | Repeat unit - degree of | | | | | |
| | | | | | - Nomenclature of st | | o regular po | lymers | - C | hai |
| | | | | | - Ionic polymerization | l . | | | 00 | - |
| | | | YMERIZ | | | | Zieglen Notte | 4 . 1 | 06 | |
| | | | | | dination polymerization | | - | - | | |
| • | -Nai | | tornoto RI | lock | z and Cratt Volumeriz | | | | | |
| | suche | | | | and Graft Polymeriz | atio | n. Polymeriza | cion c | Chine | luc |
| | <u> </u> | nsion and | emulsion | pol | lymerization. | atio | n. Polymeriza | | | • |
| Unit: III GI | LASS | nsion and TRANS | emulsion | pol EMI | lymerization. PERATURE | | • | | 06 |) |
| Unit: III GI Glass transition | LASS n tem | nsion and TRANS | emulsion ITION TE and its as | pol EMI ssoc | lymerization. PERATURE ciated properties- i) M | lech | anical Proper | ties ii) | 06 The | i rma |
| Unit: III GI Glass transition Stability- iii) | LASS n tem | nsion and TRANS | emulsion ITION TE and its as | pol EMI ssoc | lymerization. PERATURE | lech | anical Proper | ties ii) | 06 The | i rma |
| Unit: III GI Glass transition Stability- iii) Conductivity. | LASS n tem Flan | nsion and TRANS operature ne Resis | emulsion ITION TE and its as tance iv) | pol EMI ssoc C | lymerization. PERATURE ciated properties- i) M | lech v) | anical Proper Degradability | ties ii) | 06 The | i rma rica |
| Unit: IIIGIGlass transitionStability-Stability-Conductivity.Unit: IVDF | LASS n tem Flan | nsion and TRANS perature ne Resis | emulsion ITION TE and its as tance iv) | pol EMI SSOC C | lymerization. PERATURE ciated properties- i) N Chemical Resistance | fech v) ſM | anical Proper Degradability ETHODS | ties ii) vi) | 06 The Elect | i rma rica |
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|---|---|------------|
| Course | e Outcomes | K Level |
| On th | e completion of the course the student will be able to | |
| CO1: | Ability to understand the concept of polymers and types of polymerizations | [Up to K2] |
| CO2: | Discuss the types of polymerizations and glass transition temperature | [Up to K3] |
| CO3: | Interpret the associated properties of glass transition temperature and molecular weight of polymers | [Up to K3] |
| CO4: | Examine the two types of average molecular weight methods | [Up to K4] |
| CO5: | Analyze the polymers and its applications. | [Up to K4] |

CO & PO Mapping:

| Course Outcomes | Programme Outcomes (POs) | | | | | | | |
|-----------------|--------------------------|-------------|-------------|------|-------------|------|--|--|
| (COs) | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | | |
| CO 1 | 3 | 1 | 2 | 3 | 1 | 2 | | |
| CO 2 | 1 | 3 | 1 | 1 | 2 | 3 | | |
| CO 3 | 2 | 2 | 3 | 2 | 3 | 3 | | |
| CO 4 | 3 | 1 | 2 | 2 | 1 | 2 | | |
| CO5 | 1 | 3 | 2 | 3 | 2 | 1 | | |
| Weightage | 10 | 10 | 10 | 11 | 9 | 11 | | |

*3 – Advanced Application; 2 – Intermediate Development; 1 - Introductory Level

LESSON PLAN

| Unit | Course Name | Hrs | Pedagogy |
|------|---|-----|------------------------------------|
| I | BASIC CONCEPT OF POLYMERS Definition – Polymerization - Monomer - Repeat unit - degree of polymerization - Classification of polymers - Stereochemistry of polymer - Nomenclature of stereo regular polymers - Chain polymerization, free radical polymerization - Ionic polymerization. | 06 | Chalk, Talk & Power point |
| II | TYPES OF POLYMERIZATIONS Different Types of Polymerizations - Coordination polymerization - Ziegler Natta catalyst And Co-Polymerization -Random, Alternate, Block and Graft Polymerization. Polymerization techniques; bulk, solution, suspension and emulsion polymerization. | 06 | Chalk, Talk & Power point |
| ш | GLASS TRANSITION TEMPERATURE Glass transition temperature and its associated properties- i) Mechanical Properties ii) Thermal Stability- iii) Flame Resistance iv) Chemical Resistance v) Degradability vi) Electrical Conductivity. | 06 | Chalk, Talk & Power point |
| IV | DETERMINATION OF MOLECULAR WEIGHT METHODS Molecular Weight of Polymers-Number Average and Weight Average Molecular Weight Methods. Number Average Molecular Weight Methods-1. Osmometry (Vapour) 2. Viscometry. Weight Average Molecular Weight Methods-1. Light scattering 2. Ultra- centrifugation | 06 | Chalk, Talk & Power point |
| V | TYPES OF POLYMERS AND POLYMER DEGRADATION Synthetic resins and plastics - Manufacture and applications of polyethylene, PVC, Teflon, poly styrene, polymethylmethacrylate, poly urethane, phenol – formaldehyde resins, urea- formaldehyde resins and epoxy polymers. | 06 | Chalk, Talk & Power point |

Course Designed by: Dr. R. Satheesh & Dr. A.J. Sunija