



Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari Science College
Semester-1(B.Sc)

Subject: Foundation Chemistry-BSCCM11305

Type of course: Minor

Prerequisite: To provide students with the fundamental knowledge of chemistry that is essential for further studies in chemistry and related fields.

Rationale: By learning this concepts, students will develop a strong foundation in chemistry that will prepare them for further studies in the field of chemistry.

Teaching and Examination Scheme:

| Teaching Scheme | | | Credits | Examination Marks | | | | | Total Marks |
|-----------------|---|---|---------|-------------------|-----------|-----|-----------|-----|-------------|
| CI | T | P | | C | SEE | | CCE | | |
| | | | Theory | | Practical | MSE | LWA/ V | ALA | |
| 3 | 0 | 2 | 4 | 75 | 25 | 30 | 20 | 50 | 200 |

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; SEE - Semester End Evaluation; MSE- Mid Semester Examination; LWA - Lab Work Assessment; V – Viva voce; CCE-Continuous and Comprehensive Evaluation; ALA- Active Learning Activities.

3 Credits * 25 Marks = 75 Marks (each credit carries 25 Marks) Theory

1 Credits * 25 Marks = 25 Marks (each credit carries 25 Marks) Practical

SEE 100 Marks will be converted in to 50 Marks

CCE 100 Marks will be converted in to 50 Marks

It is compulsory to pass in each individual component.



Continuous Assessment:

| Sr. No | Active Learning Activities | Marks |
|--------------|---|-----------|
| 1 | Quiz Faculty will assign 10 MCQs per unit on Moodle. | 10 |
| 2 | Theme based Posters Faculty will assign a topic and students will prepare Poster and upload it to Moodle. | 10 |
| 3 | Pharmachemistry Area Analysis Faculty will assign the area and students will analyze and prepare a report in 100 words and upload it to Moodle. | 10 |
| 4 | Experiential Learning (Field / Site / Industrial Visit) Faculty will assign Field and students will prepare report and upload to Moodle | 10 |
| 5 | Attendance | 10 |
| Total | | 50 |

Course Content:

| Unit No | Course content | Hrs | % Weightage |
|---------|---|-----|-------------|
| 1 | <p>Chapter-1: Atomic structure</p> <ul style="list-style-type: none"> Electronic configuration - Aufbau principle - Pauli's exclusion principle- Hund's rule. Bonding Electrovalent, covalent, hydrogen bonds. Orbital overlap - s-s, s-p. <p>Chapter-2: Molecular Orbital Theory:</p> <ul style="list-style-type: none"> Formation of bonding and anti bonding molecular orbitals, bond order, order of energy for molecular orbitals. Molecular orbital diagram of homo nuclear diatomic molecules. Molecular orbital diagram of molecules and ions such as C₂, N₂, O₂, F₂ and H₂, H₂⁺, He₂, He₂⁺, LiH, HF, BN, BeO, CO, NO, HCl. | 14 | 25% |



| | | | |
|---|---|----|-----|
| 2 | <p>Chapter-3: IUPAC nomenclature:</p> <ul style="list-style-type: none"> • IUPAC nomenclature of mono and Bi-functional groups. • Aliphatic, alicyclic and aromatic organic compounds such as alkanes, alkenes, alkynes. • Aliphatic, alicyclic and aromatic organic compounds such as alkyl halides, nitro, alcohols. • Aliphatic, alicyclic and aromatic organic compounds such as aldehydes, ketones, carboxylic acids, esters, amines, nitriles, ethers and amides <p>Chapter-4: Catalysis</p> <ul style="list-style-type: none"> • Catalyst, inhibitor, autocatalysis. • Homogeneous and heterogeneous catalysis. • General characteristics of catalytic reactions • Theories of catalysis (chemical theory) active sites. • Applications of catalysts in industries, role of active sites in catalysis, characterization of catalysts, acid- base catalysis. • Solid acid catalysts, importance of selectivity, catalysis in atmospheric pollution control. • Concept of auto , positive and negative catalysis. | 13 | 25% |
| 3 | <p>Chapter-5 Carbohydrates</p> <ul style="list-style-type: none"> • Old and modern concept of carbohydrates with definitions. • Classification of carbohydrates. • Various Chemical reactions of glucose and fructose. • Determination of constitution and configuration of glucose and fructose. • Conversion of glucose into fructose and fructose into glucose. • Ascending and descending reactions for monosaccharides. | 10 | 25% |
| 4 | <p>Chapter-6 Amino Acid</p> <ul style="list-style-type: none"> • Brief Introduction of amino acids, • Classification of α-amino acids with proper illustrations. • Properties of amino acids. General methods for the synthesis of α-amino acids (any five). | 8 | 25% |



Suggested Specification table with Marks (Theory):75

| Distribution of Theory Marks (Revised Bloom's Taxonomy) | | | | | | |
|--|--------------------|----------------------|--------------------|----------------|-----------------|---------------|
| Level | Remembrance (R) | Understanding (U) | Application (A) | Analyze (N) | Evaluate (E) | Create (C) |
| Weightage | 25% | 40% | 35% | - | - | - |

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

| | |
|---|---|
| After learning the course the students should be able to: | |
| CO1 | Learn about electron configuration, the arrangement of electrons in atomic orbitals, and how it determines the chemical properties of elements. |
| CO2 | Understand the various theories of catalyst. |
| CO3 | Learn about Biomolecule. |
| CO4 | Apply theoretical concepts in order to describe analyze and assess chemical world. |

List of Practical:

| Sr. No | Descriptions | Unit No | Hrs |
|--------|---|---------|-----|
| 1 | Volumetric analysis (Strong acid –Strong base) <ul style="list-style-type: none"> To determine the Strength of given HCL solution in terms of Normality, gram/lit and Molarity by using 0.1 N NaOH solution. | 1-4 | 2 |
| 2 | Volumetric analysis (weak acid –Strong base) <ul style="list-style-type: none"> To determine the Strength in terms of Normality ,gram/lit of NaOH Solution by using 0.1 N H₂C₂O₄ solution. | 1-4 | 2 |
| 3 | Double Titration(Strong Acid- Mixture of Base) <ul style="list-style-type: none"> To determine the molarity and gm/lit of Na₂CO₃ and NaHCO₃ solution in mixture by using 0.1 M HCl solution. To determine the molarity and gm/lit of NaOH and Na₂CO₃ solution in mixture by using 0.05 M H₂SO₄ solution. | 1-4 | 4 |



| | | | |
|----|---|-------|----|
| 4 | Redox Titration <ul style="list-style-type: none"> To Preparation of standard solution of Oxalic acid. To standardized KMnO₄ solution by preparing standards Oxalic acid and to estimate ferrous ion. | 1-4 | 4 |
| 5 | To Analysis given organic compound- Benzoic Acid. | 1-4 | 2 |
| 6 | To Analysis given organic compound- Glucose. | 1-4 | 2 |
| 7 | To Analysis given organic compound- B-Naphthole. | 1-4 | 2 |
| 8 | To Analysis given organic compound- m-Dinitrobenzene. | 1-4 | 2 |
| 9 | To Analysis given organic compound- Urea. | 1-4 | 2 |
| 10 | To Analysis given organic compound- Nitrobenzene. | 1-4 | 2 |
| 11 | To Analysis given organic compound- chloroform | 1-4 | 2 |
| 12 | To Analysis given organic compound- Aniline | 1-4 | 2 |
| 13 | To Analysis given organic compound- Naphthelene | 1-4 | 2 |
| | | Total | 30 |

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.



Reference Books:

- 1) Basic Inorganic chemistry, -F.A.Cotton, G.Wilkinson; John Wiley & Sons
- 2) Text book of Physical Chemistry, - Glasstone ; London Macmillan & Company Ltd.
- 3) Organic Chemistry vol-I, - I.L.Finar ; Longman Scientific & Technical publication
- 4) Organic Chemistry vol-II, - I.L.Finar ; Longman Scientific & Technical publication
- 5) Vogel's Textbook of practical organic chemistry, 5th Edition by B. S. Furniss et. al.
- 6) Comprehensive practical organic chemistry, V. K. Ahuwalia

