

VANITA VISHRAM WOMEN'S UNIVERSITY

SCHOOL OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF CHEMISTRY



SEMESTER 2

Generic Elective Courses (GE)

Syllabus applicable to the students seeking admission in the following programmes

B.A. /B.Com./B.B.A./B.Sc./B.C.A. under LOCF

w.e.f. the Academic Year 2021-2022

1. Preamble – VVWU

Vanita Vishram Women's University (VVWU) is the First-ever Women's University of Gujarat approved by the Government of Gujarat under the provisions of the Gujarat Private Universities Act, 2009. It is a University committed to achieve Women's Empowerment through Quality Education, Skill Development, and by providing employment opportunities to its girl students through its model curriculum, integration of technology in pedagogy and best-in-class infrastructure. The focus is on prioritizing practical component and experiential learning supported through academia-industry linkages, functional MoUs, skill development training, internships etc. It aims at providing opportunities to the girl students for holistic development and self-reliance.

VISION

Empowerment of women through quality education and skill development, so as to make them strong pillars of stability in the society.

MISSION

To provide Education & Professional Training to all women for their all-round development, so as to enable them to become economically independent and socially empowered citizens.

SEMESTER 2
GENERIC ELECTIVE COURSE PAPER 2 (CH13030)

Fundamentals of Chemistry-II

Course Objectives

- In attaining knowledge based on working based on electrolysis and its type.
- Learning of different thermodynamic properties.
- Carbon-Carbon single and double bonds forming reactions.
- To provide the knowledge about structural features, synthesis, properties of various categories of materials.
- Reactivity, stability of organic molecules, structure, stereochemistry.
- To understand the definition, basic concepts, importance of stereochemistry.
- To provide knowledge about the structure, classification, nomenclature and designating the chiral compounds.
- To develop skills for various isomerism and stereo selective, specific synthesis and its application in organic chemistry.

Course Outcomes

After completing the course, the students will be able to:

- Basic concepts about electrolysis and thermodynamic properties used in qualitative analysis.
- Basic concepts about organic reactions, different projection formulas to represent the 3D structure of the molecules, relationship between molecules, fundamental of stereochemistry.

COURSE CONTENTS

Unit-1: Electrolysis and Electrical Conductance (Theory)

Mechanism of electrolysis, Electrical units, Faraday's laws of Electrolysis, Faraday's first law, Faraday's second law, Importance of the first Law of electrolysis, Importance of the second Law of electrolysis, Conductance of Electrolytes, Specific conductance, Equivalent conductance, Molar conductance, Variation of Equivalent conductance with Concentration (or Dilution), Variation of Conductance with Temperature, Summary of Electrochemical Quantities, Strong electrolytes, Weak electrolytes, Measurement of Electrolytic conductance, Determination of the cell Constant, Numericals

Unit-2: Thermochemistry (Theory)

Units of energy changes, Enthalpy of a reaction, Exothermic and endothermic reactions, Thermochemical equations, Heat of reaction or enthalpy of reaction, Variation of heat (or enthalpy) of reaction with temperature, Different types of heat (enthalpy) of reaction, Heat of combustion, Heat of solution, Heat of neutralisation, Energy changes during transitions or phase changes, Heat of fusion, Heat of vaporisation, Heat of sublimation, Heat of transition, Hess's law of constant, Heat summation, Applications of Hess's law, Bond energy, Measurement of the heat of reaction, Numericals

Unit-3 Chemistry of Aliphatic Hydrocarbons (Theory)

A) Carbon-Carbon sigma bonds: Chemistry of alkanes: Formation of alkanes, Wurtz Reaction, Wurtz- Fittig Reactions, Free radical substitutions: Halogenation - relative reactivity and selectivity.

B) Carbon-Carbon pi-bonds: Formation of alkenes and alkynes by elimination reactions, Mechanism of E1, E2, E1cb reactions. Saytzeff and Hofmann eliminations. Reactions of alkenes: Electrophilic additions their mechanisms (Markownikoff / Anti Markownikoff addition), mechanism of oxymercuration-demercuration, hydroboration- oxidation, ozonolysis, reduction (catalytic and chemical), syn and anti-hydroxylation (oxidation). 1, 2- and 1, 4- addition reactions in conjugated dienes and, Diels- Alder reaction; Allylic and benzylic bromination and mechanism, e.g. propene, 1-butene, toluene, ethyl benzene. Reactions of alkynes: Acidity, Electrophilic and Nucleophilic additions.

C) Cycloalkanes: Cycloalkanes and stability, Preparation & Properties, Baeyer strain theory

Unit-4 Stereochemistry of organic compounds (Theory)

Optical isomerism-elements of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization. Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature. Geometric isomerism- determination of configuration of geometric isomers. E & Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds, Conformational Isomerism-Difference between configuration and conformation. Newman projection and Sawhorse formulae, Fischer and flying wedge formula

Reference Books

- Physical Chemistry by Arun Bahl, B. S. Bahl and G. D. Tuli; Pub. S. Chand
- Text book of physical chemistry by P. L. Soni, O. P. Sharma; Pub. S. Chand
- Atkins P. and De Paula, J. Physical Chemistry Tenth Ed., OUP, 2014.
- Morrison, R. N. & Boyd, R. N. Organic Chemistry, 6th Edn., Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- F. A. Carey, Organic Chemistry, Seventh Edition, Tata McGraw Hill (2008).

- J. Clayden, N. Greeves, S. Warren, Organic Chemistry, 2nd Ed., (2012), Oxford University Press.
- Organic Chemistry by Bahl & Bahl

SEMESTER 2
GENERIC ELECTIVE COURSE PAPER 2 (CH13040)

Chemistry Practical

Course Objectives

- To understand the preparation of solutions and perform standardisation processes.
- To understand estimations of various compounds.

Course Outcomes

After completing the course, the students will be able to:

- Gain detailed knowledge of solution preparation and standardisation.
- Conduct experiments and interpret results, while observing responsible and ethical scientific conduct.

COURSE CONTENTS

A. Inorganic Qualitative Analysis (Inorganic qualitative analysis of single salt)

N. B. Candidates should perform the analysis of at least 8 compounds.

B. Estimations:

1. Estimation of Amide
2. Estimation of Aniline

Reference Books

- Quantitative analysis by R.A. Day and A.L. Underwood.
- Vogel's qualitative organic analysis.
- Elementary Practical Organic Chemistry Part-I Small Scale Preparations by A. I. Vogel.
- Practical Pharmaceutical Chemistry by A. H. Beckett, Volume I & II.
- Elementary Practical Organic Chemistry Part-III Quantitative Organic Analysis by A.I. Vogel.

TEACHING METHODOLOGY

The teaching methodologies utilized for effective learning process in the course are:

1. Direct instruction/Lecture method
2. Problem solving Method
3. Small group teaching
4. The discussion Method
5. The study assignment method
6. ICT based teaching
7. Demonstration Method
8. Seminar based Learning
9. Project based Learn in