SEMESTER I

ENVIRONMENTAL STUDIES

1. Course Description

Program: BSC
Course Code: U24/EVS/AECC/101
Course Type: AECC
No. of credits: 2

Max. Hours: 30
Hours per week: 2
Max. Marks: 50

2. Course Objectives:

- To Understand the principles of ecology and environmental issues
- To acquire the skills needed and develop a sense of responsibility to actively participate in its protection and improvement

3. Course Outcomes:

On completion of the course the student will be able to:

CO 1: Gain knowledge and develop in-depth understanding of the basics of ecological principles, conservation of biodiversity, renewable energy resources and water conservation

CO 2: Enhanced analytical capability to undertake and participate in finding solutions for various environmental issues and concerns of national and global importance to achieve environmental protection and sustainable development

CHAIR PERSON B.O.S. in Environmental Science University College of Science Osmania University Hyderabad-500 007.

Head Dept.of Environmental Studies St.Francis College for Women (Autonomous) Begumpet,Hyderabad-16

4. COURSE CONTENT

UNIT - I: Ecosystem, Biodiversity & Natural Resources (15 hrs.)

1. Definition, Scope & Importance of Environmental Studies
2. Structure of Ecosystem – Abiotic & Biotic Components, Ecological Pyramids
3. Definition of Biodiversity, Genetic, Species & Ecosystem Diversity, IUCN Red list, Hotspots of Biodiversity, Threats and Conservation of Biodiversity (*Insitu & Exsitu*)
4. Renewable Energy Resources – Solar, Wind and Biomass
5. Water Conservation, Water Footprint, Rain Water Harvesting
6. Environmental Ethics

UNIT – II: Environmental Pollution, Global Issues & Legislation (15 hrs.)

1. Causes, Effects and Control Measures of Air and Water Pollution
2. Solid and Plastic Waste Management, Zero Waste Management
3. Global Warming & Ozone Layer Depletion, Carbon Footprint
4. Environmental Laws and Acts-Wildlife Protection Act, Forest Act, Air Act, Water Act
5. People's Participation in Environmental Protection- Silent Valley, Bishnois of Rajasthan
6. Disaster Management-Flood, Earthquake and Cyclones
7. Environmental Management
8. Role of Information Technology in Environmental Protection and Health

Field visit:

1. Visit to Solar Plant in your Locality/City
2. A Glimpse of Biodiversity in Hyderabad/ Visit to National Parks and a Walk-Through Campus
3. Visit to a Nearby Lake

CHAIRPERSON B.O.S. in Environmental Science University College of Science Osmania University Hyderabad-500 007.

Head Dept.of Environmental Studies St.Francis College for Women (Autonomous) Begumpet,Hyderabad-16

5. REFERENCES:

Books:

- Text book of Environmental Studies for undergraduate courses (second edition) by Erach Bharucha
- Environmental Studies by Dr. J.P. Sharma
- Perspectives in Environmental Studies – Anubha Kaushik & C.P. Kaushik
- A text book of Environmental Studies by Dr. D. K. Asthana and Dr. Meera Asthana
- Environmental Science by Dr. Syeda Azeem Unnisa

Magazines:

- **Terra Green (a monthly digital magazine on environmental issues)**
- Down to Earth, Centre for Science &
- Environment Survey of the Environment published by The Hindu

E-Resources:

- https://www.cseindia.org/
- https://www.ugc.gov.in/oldpdf/modelcurriculum/env.pdf

6. Syllabus Focus

a) Relevance to Local, Regional, National and Global Development Needs

Local /Regional/ National /Global Development Needs	Relevance
Local needs	Develop a critical understanding of Environmental issues and concerns. Inculcate the environmental ethics and work for sustainable future Utilise the potential application of Methods of Solid Waste Management in the Waste management concerns Involve in community development through extension and organising programs.
Regional needs	Creates awareness on pollution and threats to biodiversity in the Ecosystem
National needs	Have an over view of mitigation measures of disaster management. Explain major conservation strategies taken in India. Apply the Knowledge of role of information technology in protection of the environment.
Global needs	Environmental studies is globally relevant to monitor environmental issues and for the sustainable development. It deals with issues and challenges of environment management in the changing climate scenario.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
Skill Development, Entrepreneurship Development, Employability	Unit II Solid Waste Management	Demonstration of Composting, Vermicomposting and the preparation of Bio-Enzymes. Awareness on scope of green entrepreneurship and employability related to Solid waste management

7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Experiential learning	Field trips, Documentary watching, Demonstrations, Student volunteering days, Plantation drives, Clean up drives
2.	Participative Learning	Seminars, Workshops, Guest lectures, Group Discussion, Library reference, Presentations and Competitions, Demonstrations by students
3.	Problem Solving	Case Studies, Projects

8. Course Assessment Plan

a) Weightage of Marks in Internal Assessments and End Semester Examination

CO	Internal Assessments IA -40%	End Semester Examination-60%
CO1	Field Visit report/Case Study/ Poster making/ Presentations/Eco Friendly product making/Model making	Written Exam
CO2		

CHAIR PERSON B.O.S. in Environmental Science University College of Science Osmania University Hyderabad-500 007.

Head Dept.of Environmental Studies St.Francis College for Women (Autonomous) Begumpet,Hyderabad-16

b) Model Question Paper- End Semester Exam

ENVIRONMENTAL STUIDES

Course Code: U24/EVS/AECC/101

Time: 1 Hour **Max. Marks: 30**

Answer any five of the following: **5X6=30**

1. Define environmental studies and mention the importance of environmental studies.
2. "Biomass is an important source of energy", Discuss.
3. Explain the rooftop rainwater harvesting system with the help of a diagram.
4. Identify the reasons for water pollution in your region and suggest measures to reduce the water pollution.
5. Discover the initiatives taken by swachh cities in solid waste management.
6. Comment on "Silent Valley- A people's movement that saved a forest."
7. List out the changes you would make in your lifestyle to reduce your carbon footprint.

c) Question Paper Blueprint

Modules	Hours Allotted in the Syllabus	COs Addressed	Section A (No. of Questions)	Total Marks
I	15	CO 1	3	6
II	15	CO 2	4	6

Prepared by	Checked & Verified by	Approved by
G. Dhanalakshmi Head, Dept. of Environmental Studies	G. Dhanalakshmi, Head, Dept. of Environmental Studies	Dr. Uma Joseph Principal

CHAIR PERSON B.O.S. in Environmental Science University College of Science Osmania University Hyderabad-500 007.

Head Dept.of Environmental Studies St.Francis College for Women (Autonomous) Begumpet,Hyderabad-16

SEMESTER II

ENVIRONMENTAL STUDIES

6. Course Description

Program: BA, BMS & BCOM
Course Code: U24/EVS/AECC/201
Course Type: AECC
No. of credits: 2

Max. Hours: 30
Hours per week: 2
Max. Marks: 50

7. Course Objectives:

- To Understand the principles of ecology and environmental issues
- To acquire the skills needed and develop a sense of responsibility to actively participate in its protection and improvement

8. Course Outcomes:

On completion of the course the student will be able to:

CO 1: Gain knowledge and develop in-depth understanding of the basics of ecological principles, conservation of biodiversity, renewable energy resources and water conservation

CO 2: Enhanced analytical capability to undertake and participate in finding solutions for various environmental issues and concerns of national and global importance to achieve environmental protection and sustainable development

9. COURSE CONTENT

UNIT - I: Ecosystem, Biodiversity & Natural Resources (15 hrs.)

1. Definition, Scope & Importance of Environmental Studies
2. Structure of Ecosystem – Abiotic & Biotic Components, Ecological Pyramids
3. Definition of Biodiversity, Genetic, Species & Ecosystem Diversity, IUCN Red list, Hotspots of Biodiversity, Threats and Conservation of Biodiversity (*Insitu & Exsitu*)
4. Renewable Energy Resources – Solar, Wind and Biomass
5. Water Conservation, Water Footprint, Rain Water Harvesting
6. Environmental Ethics

UNIT – II: Environmental Pollution, Global Issues & Legislation (15 hrs.)

1. Causes, Effects and Control Measures of Air and Water Pollution
2. Solid and Plastic Waste Management, Zero Waste Management
3. Global Warming & Ozone Layer Depletion, Carbon Footprint
4. Environmental Laws and Acts-Wildlife Protection Act, Forest Act, Air Act, Water Act
5. People's Participation in Environmental Protection- Silent Valley, Bishnois of Rajasthan
6. Disaster Management-Flood, Earthquake and Cyclones
7. Environmental Management
8. Role of Information Technology in Environmental Protection and Health

Field visit:

1. Visit to Solar Plant in your Locality/City
2. A Glimpse of Biodiversity in Hyderabad/ Visit to National Parks and a Walk-Through Campus
3. Visit to a Nearby Lake

10. REFERENCES:

Books:

- Text book of Environmental Studies for undergraduate courses (second edition) by Erach Bharucha
- Environmental Studies by Dr. J.P. Sharma
- Perspectives in Environmental Studies – Anubha Kaushik & C.P. Kaushik
- A text book of Environmental Studies by Dr. D. K. Asthana and Dr. Meera Asthana
- Environmental Science by Dr. Syeda Azeem Unnisa

Magazines:

- **Terra Green (a monthly digital magazine on environmental issues)**
- Down to Earth, Centre for Science &
- Environment Survey of the Environment published by The Hindu

E-Resources:

- https://www.cseindia.org/
- https://www.ugc.gov.in/oldpdf/modelcurriculum/env.pdf

CHAIR PERSON B.O.S. in Environmental Science University College of Science Osmania University Hyderabad-500 007.

Head Dept.of Environmental Studies St.Francis College for Women (Autonomous) Begumpet,Hyderabad-16

6. Syllabus Focus

a) Relevance to Local, Regional, National and Global Development Needs

Local /Regional/ National /Global Development Needs	Relevance
Local needs	Develop a critical understanding of Environmental issues and concerns. Inculcate the environmental ethics and work for sustainable future Utilise the potential application of Methods of Solid Waste Management in the Waste management concerns Involve in community development through extension and organising programs.
Regional needs	Creates awareness on pollution and threats to biodiversity in the Ecosystem
National needs	Have an over view of mitigation measures of disaster management. Explain major conservation strategies taken in India. Apply the Knowledge of role of information technology in protection of the environment.
Global needs	Environmental studies is globally relevant to monitor environmental issues and for the sustainable development. It deals with issues and challenges of environment management in the changing climate scenario.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
Skill Development, Entrepreneurship Development, Employability	Unit II Solid Waste Management	Demonstration of Composting, Vermicomposting and the preparation of Bio-Enzymes. Awareness on scope of green entrepreneurship and employability related to Solid waste management

7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Experiential learning	Field trips, Documentary watching, Demonstrations, Student volunteering days, Plantation drives, Clean up drives
2.	Participative Learning	Seminars, Workshops, Guest lectures, Group Discussion, Library reference, Presentations and Competitions, Demonstrations by students
3.	Problem Solving	Case Studies, Projects

8. Course Assessment Plan

a) Weightage of Marks in Internal Assessments and End Semester Examination

CO	Internal Assessments IA -40%	End Semester Examination-60%
CO1	Field Visit report/Case Study/ Poster making/ Presentations/Eco Friendly product making/Model making	Written Exam
CO2		

b) Model Question Paper- End Semester Exam

ENVIRONMENTAL STUIDES

Course Code: U24/EVS/AECC/201

Time: 1 Hour **Max. Marks: 30**

Answer any five of the following: **5X6=30**

1. Define environmental studies and mention the importance of environmental studies.
2. "Biomass is an important source of energy", Discuss.
3. Explain the rooftop rainwater harvesting system with the help of a diagram.
4. Identify the reasons for water pollution in your region and suggest measures to reduce the water pollution.
5. Discover the initiatives taken by swachh cities in solid waste management.
6. Comment on "Silent Valley- A people's movement that saved a forest."
7. List out the changes you would make in your lifestyle to reduce your carbon footprint.

c) Question Paper Blueprint

Modules	Hours Allotted in the Syllabus	COs Addressed	Section A (No. of Questions)	Total Marks
I	15	CO 1	3	6
II	15	CO 2	4	6

Prepared by	Checked & Verified by	Approved by
G. Dhanalakshmi Head, Dept. of Environmental Studies	G. Dhanalakshmi, Head, Dept. of Environmental Studies	Dr. Uma Joseph Principal

CHAIR PERSON B.O.S. in Environmental Science
University College of Science
Osmania University
Hyderabad-500 007.

Head
Dept.of Environmental Studies
St.Francis College for Women
(Autonomous)
Begumpet,Hyderabad-16

St. FRANCIS COLLEGE FOR WOMEN, BEGUMPET HYDERABAD-500016 (An Autonomous College Affiliated to Osmania University)

DEPARTMENT OF CHEMISTRY

DISCIPLINE SPECIFIC CORE I
CHEMISTRY PAPER I
B.Sc. I - SEMESTER- II 60 Hrs

Module 1: Inorganic Chemistry

p-block elements

Interhalogen Compounds

Chemistry of Zero group elements

Boranes and Carboranes

Metal carbonyls

Module 2: Physical Chemistry

Electrochemistry

Module 3: Organic Chemistry

Aromatic Hydrocarbons
Halogen compounds
Alcohols, Phenols, Ethers

Module 4: General Chemistry

Solutions
Symmetry of molecules
Stereochemistry of Carbon Compounds

CHEMISTRY – II

Course Description

Programme: **B.Sc.** Max. Hours: **60 Hrs**

Course Code: **U24/CHE/DSC/201** Hours per week: **4 Hrs**

Course Type: **DSC-2** Max. Marks: **100**

No. of credits: **4**

Course Objectives

- To study about the elements of p block and the properties of their compounds.
- To understand the behavior of electrolytes in solution and to know the applications of electrode

Chairperson
Board of Studies in Chemistry
Dept of Chemistry
Osmania University, Hyd-07.

process.

- To learn the methods of preparation and reactivity of hydrocarbons with mechanisms and to classify and identify organic molecules by their functional groups.

- To learn the structures of basic organic molecules, the types of reactions they undergo and their stereochemistry and to foster acquisition of knowledge on the concepts of solutions.

Course Outcomes

On completion of the course the student will be able to:

CO1: Acquire knowledge on p-block elements.

CO2: Understand the theory of electrical conductance, transformation of chemical energy into electrical energy in Galvanic cells.

CO3: Interpret the concept of aromaticity and familiarize with the various types of aliphatic and aromatic reactions. Recognize functional groups in organic molecules and predict their reactivity through mechanisms.

CO4: Application of the behaviour of solutions and acquire a fundamental understanding of the relationships between molecular structure and reaction mechanisms.

Course Content

MODULE I: Inorganic Chemistry **(15 Hrs)**

p-block elements **(10 Hrs)**

General Characteristics of p block elements.

Group – 13: Synthesis and structure of diborane and higher Boranes (B_2H_6 and B_4H_{10}) Preparation and structure of boron-nitrogen compounds ($B_3N_3H_6$ and BN), Lewis acid nature of the BX.

Group – 14: Classification (ionic, covalent, interstitial) and industrial applications of Carbides. Preparation, classification (straight chain, cyclic and cross-linked) and applications of silicones, Preparation and applications of graphitic compounds.

Group – 15: Preparation, structure and reactions of hydrazine, hydroxylamine, Phosphazenes
Group – 16: Classifications of oxides based on (i) Chemical behavior and (ii) Oxygen content. Normal: acid, basic, amphoteric and neutral, Mixed oxides, Sub oxides, Peroxides, Super oxides.

Oxyacids of N, P, S and Cl – structure, acidic nature and redox

properties

Interhalogen Compounds

Classification- general preparation- structures of AB, AB_3, AB_5 and AB_7 type and reactivity. Poly halides- definition and structure of ICl_2^-, ICl_4^- and I_3^-.Comparison of Pseudo halogens with halogens.

Chemistry of Zero group elements

Chairperson
Board of Studies in Chemistry
Dept of Chemistry
Osmania University, Hyd-07.

General preparation, structure, bonding and reactivity of Xenon compounds – Oxides, Halides. Clathrate compounds.

Boranes and Carboranes **(2 Hrs)**

Definition of clusters. Structures of boranes and carboranes- Wade's rules, closo, nido, arachno Boranes and carboranes

Metal carbonyls **(3 Hrs)**

Preparation and properties of $Ni(CO)_4$. Structural features of $Ni(CO)_4$, $Fe(CO)_5$, $Fe_2(CO)_9$ and $Cr(CO)_6$-18 valence electron rule.

MODULE II: Physical Chemistry (15 Hrs)

Electrochemistry

Electrical transport – conduction in metals & in electrolyte solutions, specific conductance & equivalent conductance and measurement of equivalent conductance, variation of specific and equivalent conductance with dilution. Migration of ions and Kholrausch's law. Arrhenius theory of electrolytic dissociation and its limitation, weak and strong electrolytes, Ostwald's dilution law, its uses and limitations. Debye- Huckel- Onsagar's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf method for attackable and non-attackable electrodes. Applications of conductivity measurements. Determination of degree of dissociation, determination of K_a of acids, determination of solubility product of sparingly soluble salt, conductometric titrations. Electrolytic and Galvanic cell – reversible and irreversible cells, conventional representation of electrochemical cell. EMF of a cell and its measurement. Computation of EMF. Types of reversible electrodes gas electrode, metal - metal ion, metal - insoluble salt and redox electrode. Electrode reactions, Nernst equation, cell EMF and single electrode potential, stanard Hydrogen electrode – reference electrodes (calomel electrode) – standard electrode potential, sign conventions, electrochemical series and its significance. Calculation of thermodynamic quantities of cell reaction – ΔG, ΔH and K .Determination of pH using Hydrogen electrode, Glass electrode, quinhydrone electrode, solubility product of AgCl. Potentiometric titrations.

MODULE III: Organic Chemistry (15 Hrs)

Aromatic Hydrocarbons **(6 Hrs)**

Concept of aromaticity –definition, Huckel's rule – application to Benzenoids and Non – Benzenoids (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation).
Preparations: From acetylene, phenols, benzene carboxylic acids and sulphonic acids
Reactions - General mechanism of electrophilic substitution, mechanism of nitration, sulphonation,and halogenation, Friedel Craft's alkylation and acylation. Orientation of aromatic substitution - Definition of ortho, para, and meta directing groups. Ring activating and deactivating groups with examples. Orientation – (i) activating groups: Amino, methoxy and alkyl groups. (ii) Deactivating groups - carboxyl, nitro, nitrile, carbonyl and sulphonic acid & halo groups.

Chairperson
Board of Studies in Chemistry
Dept of Chemistry
Osmania University, Hyd-07.

Halogen compounds **(4 Hrs)**

Nomenclature and classification: alkyl (primary, secondary, tertiary), aryl, aralkyl, allyl, vinyl, benzyl. Chemical reactivity - reduction, formation of RMgX, Nucleophilic substitution reactions – classification into S_N1 and S_N2. Mechanism and energy profile diagrams of S_N1 and S_N2 reactions. Stereochemistry of S_N2 (Walden Inversion) 2-Bromobutane, S_N1 (Racemisation) 1-Bromo-1-phenylpropane explanation of both by taking the example of optically active alkyl halide.Structure and reactivity – Ease of hydrolysis - comparison of alkyl, vinyl, allyl, aryl, and benzyl halides.

Alcohols, Phenols, Ethers **(5 Hrs)**

Alcohols: Preparation of 1°, 2° and 3° alcohols using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones, carboxylic acid and esters. Reactions: With sodium, HX (Lucas test), esterification (mechanism), oxidation (with PCC, alk. $KMnO_4$, acidic dichromate, conc. HNO_3). Oppenauer oxidation

Diols: oxidation of diols, Pinacol – Pinacolone rearrangement.

Phenols: Preparation: Cumene hydroperoxide method, from diazonium salts. Reactions: Electrophilic substitution: Nitration, Halogenation and sulphonation. Reimer- Tiemann Reaction (with mechanism), Gattermann Aldehyde Reaction, Houben–Hoesch Condensation, Schotten – Baumann Reaction, Azo coupling reactions

Ethers (aliphatic and aromatic): Preparation: Williamson synthesis, Reaction: Cleavage of ethers with HI.

MODULE IV: General Chemistry **(15 Hrs)**

Solutions **(6 Hrs)**

Liquid- liquid mixtures – ideal liquid mixtures, Raoult's and Henry's law. Non – ideal systems. Azeotropes: HCl-H_2O, ethanol – water systems. Fractional distillation. Partially miscible liquids – phenol – water, trimethyl amine – water system, Nicotine - water

Lower and upper consolute temperature. Effect of impurity on consolute temperature. Immiscible liquids and steam distillation.

Symmetry of molecules (3 Hrs)

Symmetry operations and symmetry elements in molecules. Definition of Axis of symmetry types of Cn, Plane of symmetry (σh, σv, σd) Center of symmetry and improper rotational axis of symmetry (Sn). Explanation with examples.

Stereochemistry of Carbon Compounds (6 Hrs)

Conformations with respect to ethane, butane and cyclohexane. Molecular representation: Wedge Formula, Newmann, Sawhorse and Fischer representations. Optical isomerism: optical activity, optical rotation and specific rotation, Concept of chirality. Examples: Glyceraldehyde, Lactic acid, Alanine. Molecules with similar chiral carbons (Tartaric acid), Enantiomers and Meso compounds. Molecules with dissimilar chiral carbons (2,3 – Dibromopentane). Diastereomerism. Configuration: Relative (D and L) and Absolute configuration, CIP Rules: R/S Racemic mixture racemization and resolution techniques (chemical method only) Geometrical isomerism with reference to alkenes and cycloalkanes: cis – trans and E/Z configuration.

Chairperson
Board of Studies in Chemistry
Dept of Chemistry
Osmania University, Hyd-07.

SEMESTER-1I

ENZYMES & ANALYTICAL TECHNIQUES

1. Course Description

Programme	**: B.Sc.**	**Max. Hours:**	**60**
Course Code	**: U24/BIC/DSC/201**	**Hours per week:**	**4**
Type of course	**: DSC 2**	**Max. Marks:**	**100**
No. of credits	**: 4**		

2. Course Objectives

- To acquire knowledge about concepts of enzymes, thermodynamics and energy transformations observed in living systems.
- To learn various important techniques of separation like chromatography, electrophoresis, centrifugation, and spectroscopy.

3. Course Outcomes

After the successful completion of the course, the student will be able to:

CO1: Describe enzymes, nomenclature, mechanism of enzyme action and kinetics. (L2)

CO2: Demonstrate the influence of thermodynamics of biochemical reactions. (L3)

CO3: Illustrate the separation techniques like chromatography, electrophoresis and centrifugation. (L3)

CO4: Analyze the principle and applications of spectrophotometry and radioactivity(L4).

4. Course Content –

Module I: ENZYMES **(15 hrs)**

Introduction to bio catalysis, Difference between chemical and biological catalysis.Nomenclature and classification of enzymes. Characteristic features of enzymes. Introduction to the principles of activation energy, transition state, Active site. Outline of mechanism of enzyme action – lock and key model, induced fit model.

Factors affecting catalysis – substrate concentration, pH, temperature, activators and inhibitors (competitive and non-competitive types). Michaelis constant (Km) and its significance. Line Weaver – Burk plots, Isoenzymes, zymogen activation – activation of trypsinogen and chymotrypsinogen, allosteric enzymes (elementary treatment). Ribozyme, abzyme (definitions only).

Module II: BIOENERGETICS **(15 hrs)**

Energy transformations in the living system, First and second laws of Thermodynamics; Concept of enthalpy, entropy, free energy, exergonic and endergonic reactions. Helmholtz &Gibbs free energy. Relationship between standard free energy change and equilibrium constant.

High energy compounds and their role. Ultrastructure of mitochondria – F_0 F_1 ATPase; Oxidative phosphorylation- mitochondrial electron transport chain and carriers involved, sites of ATP production.

Outline of mechanism and Theories of oxidative phosphorylation:

- Chemical coupling hypothesis
- Conformational coupling hypothesis
- Chemiosmotic coupling hypothesis.

Oxidation of extramitochondrial NADH – Shuttle systems,

- Malate Aspartate shuttle
- Glycerol 3 phosphate shuttle

ATP yield and P/O ratio. Inhibitors and uncouplers of oxidative phosphorylation.

Module III: SEPARATION TECHNIQUES **(15 hrs)**

Chromatography - Principles and applications of separation methods like paper, thin layer, Ion exchange, gel-filtration, Affinity Chromatography.

Electrophoresis –Principles and applications of paper, agarose, and polyacrylamide - native and SDS gel electrophoresis.Centrifugation – Principles and applications of centrifugation techniques – Differential, density gradient. Dialysis.

Module IV: SPECTROSCOPIC&RADIO ISOTOPIC TECHNIQUES **(15 hrs)**

Colorimetry and Spectrophotometry – Laws of light absorption- Beer Lambert's law, UV and Visible absorption spectra, molar extinction coefficient. Biochemical applications of spectrophotometer. Principles of fluorimetry& Flame photometry.

Nature of radioactivity; Radio isotopes; types of radioactive decay; β and γ emitters; Units of Radioactivity, Half-life. Uses of radioisotopes in biology.

5. Reference Books

1. Lehninger: Principles of Biochemistry (2013) 6thed.,Nelson, D.L. and Cox, M.M.W.H. Freeman and Company (New York).
2. Trevor Palmer: Enzymes (Biochemistry, Biotechnology, Clinical Chemistry), (2001) Horwood Publishing, ISBN 1-898563-78-0.
3. Wilson & Walker : Principles & Biochemical Techniques of Practical Biochemistry,(2000) Cambridge University Press. (Fifth Edition)
4. Upadhyaya &Upadhyaya. Biophysical Chemistry (2009) Himalayan Publishers.
5. Mathews: Biochemistry –3rd edition. Pearson Education Limited. (2003). ISBN: 81-297-0215-0.

6. Syllabus Focus

a) Relevance to Local , Regional , National and Global Development Needs

Local /Regional/National /Global Development Needs	Relevance
Global Development needs	Analytical techniques play a crucial role in various fields and industries, providing valuable insights and information
Global Development needs	Studying thermodynamic principles aid in easy understanding of cellular processes and energy flow

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD/EMP	Chromatography	Practicals
SD/EMP	Centrifugation	Practicals
SD/EMP	Electrophoresis	Practicals

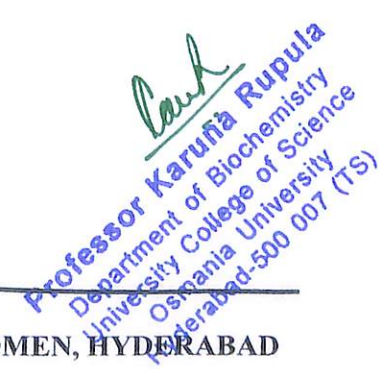
7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Science experiments	Experiential Learning
2.	Field trip	Experiential Learning
3.	Presentations/Assignments	Participative Learning

8. Course Assessment Plan

a) Weightage of Marks in Continuous Internal Assessments and End Semester Examination

COs	Continuous Internal Assessments – CIA (40%)	End Semester Examination (60%)
CO1	CIA-1	End Semester examination
CO2	CIA-1	
CO3	CIA-2 - Objective	
CO4	CIA-2 - Assignment/ model making/ PPT	



b) **Model Question Paper**

ENZYMES & ANALYTICAL TECHNIQUES

Code : U24/BIC/DSC/201
Credits : 4

Max Marks : 60
Time : 2 Hrs

I. Answer the following questions **(4x10=40M)**

1. (a) Explain the factors affecting the enzyme catalysis.
   OR
   (b) Give the classification of enzymes with suitable examples.

2. (a) Illustrate the mitochondrial electron transport chain.
   OR
   (b) Explain the laws of thermodynamics

3. (a) Demonstrate the principle & applications of Ion exchange chromatography.
   OR
   (b) Demonstrate the principle & application of Affinity chromatography.

4. (a) Distinguish Colorimetry & Spectrophotometry
   OR
   (b) Analyze the types of Isotopes? Enumerate the uses of Radioisotopes.

II. Write Short notes on any 4 questions **(4x5=20M)**

5. Lock and key hypothesis
6. Malate aspartate shuttle
7. Principle of paper chromatography
8. Dialysis
9. Molar extinction coefficient
10. Half life

CBCS-2024

GUIDELINES FOR MODEL PAPER SETTING AS PER BLOOMS TAXONOMY LEVEL (BTL)

Semester II : Enzymes & Analytical Techniques

SECTION A - INTERNAL CHOICE (4 X 10 M = 40 M)				
Question Number	**Question**	**Question**	**CO**	**BTL (Blooms Taxonomy Level)**
1	**Module 1**	Explain the factors affecting the enzyme catalysis.	**CO 1**	**2**
2	**Module 1**	Give the classification of enzymes with suitable examples	**CO 1**	**1**
3	**Module 2**	Illustrate the mitochondrial electron transport chain.	**CO 2**	**3**
4	**Module 2**	Explain the laws of thermodynamics	**CO 2**	**2**
5	**Module 3**	Demonstrate the principle & applications of Ion exchange chromatography	**CO 3**	**3**
6	**Module 3**	Demonstrate the principle & application of Affinity chromatography	**CO 3**	**3**
7	**Module 4**	Distinguish Colorimetry & Spectrophotometry	**CO 4**	**4**
8	**Module 4**	Analyze the types of Isotopes? Enumerate the uses of Radioisotopes.	**CO 4**	**4**
SECTION B - ANSWER ANY 4 OUT OF 6 (4Q X 5M = 20M) (To compulsorily have **ONE** question from **each** module)				
9	**Module 1**	Lock and key hypothesis	**CO 1**	**2**
10	**Module 2**	Malate aspartate shuttle	**CO 2**	**3**
11	**Module 3**	Principle of paper chromatography	**CO 3**	**3**
12	**Module 4**	Dialysis	**CO 3**	**3**
13	**Any Module**	Molar extinction coefficient	**CO 4**	**4**
14	**Any Module**	Half life	CO 4	**4**

ENZYMES & ANALYTICAL TECHNIQUES

PRACTICAL

1. Course Description:

Max. Hours: 30
Course Code: U24/BIC/DSC/201/P
Type of course: DSC

Hours per week: 2
No. of credits: 1
Max. Marks: 50

2. Course objective:

- Acquire skills of important separation techniques.

3. Course Outcome:

CO1: Demonstrate their skills in qualitative identification of amino acids.

CO2: Apply the knowledge of separation techniques of biomolecules.

PRACTICAL SESSIONS

1. Qualitative Analysis of Amino acids (4 sessions)
2. Separation of Sugars by Paper Chromatography
3. Separation of Amino Acids by Paper Chromatography
4. Separation of Lipids by TLC
5. Separation of Plant Pigments on Alumina Column
6. Gel Filtration Chromatography
7. Paper Electrophoresis
8. Dialysis
9. Formal Titration of Amino Acid – Glycine

MODEL QUESTION PAPER
PRACTICAL

Course Code: U24/BIC/DSC/201/P
Credits: 1

Max Time: 2 Hrs
Max. Marks: 50

Answer the following: -

1. Write the schematic representation (flowchart) for the qualitative analysis of
   c. Amino acids
   d. Principle involved in Gel filtration chromatography (10 M)
2. Identify the given amino acid present in the given solutions **A** and **B** (10 + 10 M)
3. Perform Paper chromatography of amino acids & calculate the Rf value of the mixture. (10 M)
4. Viva (5M)
5. Record (5M)

Prepared by Course Teacher [Name & Signature]	Checked & Verified by HOD [Name & Signature]	Approved by the Principal
Dr. G. Sony	(S. Malathi Varma) 21/2/24	

HOD Biochemistry
St. Francis College for Women
Begumpet, Hyderabad-16.

Professor Karuna Rupula
Department of Biochemistry
University College of Science
Osmania University
Hyderabad-500 007 (TS)

SEMESTER – II
MICROBIAL PHYSIOLOGY -THEORY

1. Course Description:

Programme: B.Sc.
Course Code:U24/MIC/DSC/201
Course Type: DSC
No. of credits: 4

Max. Hours: 60
Hours per week: 4
Max. Marks: 100

2. Course Objectives:

- This course will help the students gain knowledge about the Microbial physiology and metabolism by understanding microbial nutrition and growth characteristics.
- Differentiating concepts of aerobic and anaerobic respiration and how these are manifested in the form of different metabolic pathways in microorganisms.

3. Course Outcomes:

CO 1: Gain knowledge about nutrient transport and growth characteristics of the microorganisms and the mechanisms of energy generation for their survival. (L II), (L III)

CO 2: Understand central metabolic pathways, energy production and growth characteristics. (LII)

CO 3: Attain insight about aerobic respiration and Photosynthesis of Green, Purple bacteria and Cyanobacteria. (L IV), (L VI)

CO 4: Analyse the concepts of anaerobic respiration and fermentation through different metabolic pathways in microorganisms. (L IV)

Chairperson, BoS
Department of Microbiology
Osmania University, Hyd-07

HEAD
Department of Microbiology
Osmania University
Hyderabad-500 007.

4. **Course Content:**

MODULE I - MICROBIAL NUTRITION: **(15 Hrs)**

Nutritional requirements of microbes, nutrient uptake. Microbial growth in response to nutrition and energy – Autotroph/Phototroph, Heterotrophy, Chemolithoautotroph, Chemolithoheterotroph, Chemoheterotroph, Photolithoautotroph, Photoorganoheterotroph. Introduction to aerobic and anaerobic chemolithotrophy with an example each. Hydrogen oxidation (definition and reaction), methanogenesis (definition and reaction) and acetogens.

MODULE II - MICROBIAL GROWTH AND METABOLISM: **(15Hrs)**

Definitions of growth, Batch culture, Continuous culture, generation time and specific growth rate. Synchronous growth, diauxic growth curve. Measurement of microbial growth. Microbial growth in response to environment -Temperature (psychrophiles, mesophiles, thermophiles, extremophiles, thermodurics, psychrotrophs), pH (acidophiles, alkaliphiles), Solute and water activity (halophiles, xerophiles, osmophiles), Oxygen (aerobic, anaerobic, microaerophilic, facultative aerobe, facultative anaerobe), barophiles with examples.

MODULE III- AEROBIC RESPIRATION & PHOTOTROPHISM: **(15 Hrs)**

Sugar degradation pathways i.e. EMP, ED, Pentose phosphate pathway , TCA cycle, Electron transport chain. Introduction to phototrophic metabolism - groups of phototrophic microorganisms, anoxygenic vs. oxygenic photosynthesis with reference to phototrophism in Green bacteria, Purple bacteria, Cyanobacteria.

MODULE IV- ANAEROBIC RESPIRATION & FERMENTATION: **(15Hrs)**

Anaerobic respiration with special reference to dissimilatory nitrate reduction (Denitrification; nitrate /nitrite and nitrate/ammonia respiration; fermentative nitrate reduction Fermentation- Alcohol fermentation and Pasteur effect; Lactate fermentation (homofermentative and heterofermentative pathways), concept of linear and branched fermentation pathways.

Chairperson, BoS
Department of Microbiology
Osmania University, Hyd-07

HEAD
Department of Microbiology
Osmania University
Hyderabad-500 007.

5.Resources:

Text Books:

1. Joanne M. Willey, Linda M Sherwood, Christopher J Wooolverton (2011). Prescott's Microbiology. 8th edition,Mc.Graw Hill publishers.
2. Reddy SR and Reddy SM. (2005). Microbial Physiology. Scientific Publishers India.

Reference Books:

1. Madigan MT, and Martinko JM (2014). Brock Biology of Microorganisms. 14th edition. Prentice Hall International Inc.
2. Moat AG and Foster JW. (2002). Microbial Physiology.4th edition.John Wiley & Sons.
3. Stanier RY, Ingrahm JI, Wheelis ML and Painter PR. (1987). General Microbiology. 5th edition,McMillan Press.
4. Gopal Reddy *et al,* (2006), Laboratory experiments in Microbiology, Himalaya Publishers.
5. Prescott, Harley and Klein Wim.(2002), Microbiology , Mc.Graw Hill Publishers.
6. R.C Dubey, D.K Maheshwari, Practical Microbiology, S Chand and Company, New Delhi.
7. Cappucino J and Sherman N. (2010). Microbiology: A Laboratory Manual. 9th edition. Pearson Education Limited.

Online Resources:

1. https://microbiologynotes.org/introduction-to-the-microbial-nutrition
2. https://thebiologynotes.com/microbial-growth-and-nutritio
3. http://webbuild.knu.ac.kr/~appmic//introduction%20to%20microbiology/chap8-metabolism.pdf
4. https://bio.libretexts.org/Bookshelves/Microbiology/Microbiology_(OpenStax)/08%3A_Microbial_Metabolism
5. https://www.ncbi.nlm.nih.gov/books/NBK7919/
6. https://microbenotes.com/anaerobic-respiration/
7. https://www.khanacademy.org/science/ap-biology/cellular-respiration-ap/a/fermentation-and-anaerobic-respiration

Chairperson, BoS
Department of Microbiology
Osmania University, Hyd-07

HEAD
Department of Microbiology
Osmania University
Hyderabad-500 007.

6. Syllabus Focus:

a) Relevance to Local, Regional, National and Global Development Needs

Local/Regional/National /Global Development Needs	Relevance
Global needs	Microorganisms play important role in environment as producers, consumers and decomposers. It holds Global needs as Microbiologists play an important role in disease prevention, the development of agrochemicals, and even the preservation of the environment by closely analysing microorganisms.

a) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
Skill Development	MODULE II	To facilitate the learning process, the students would be trained to cultivate bacteria in different environmental conditions to demonstrate as how it affects their growth and patterns. Problems based questions will be framed to calculate the generation time of bacteria. This procedure aims at developing the skills necessary to analyze different (and perhaps more complex) metabolic processes.

Chairperson, BoS
Department of Microbiology
Osmania University, Hyd-07

HEAD
Department of Microbiology
Osmania University
Hyderabad-500 007.

7. Pedagogy:

S. No	Type/Description of Activity	Student Centric Methods Adopted
1.	Interactive class session	Participative Learning
2.	Quiz	Experiential Learning
3.	Group Discussion	Participative Learning

8. Course Assessment Plan:

a) Weightage of Marks in Continuous Internal Assessments and End Semester Examination

Cos	Continuous Internal Assessments - CIA (40%)	End Semester Examination - (60%)
CO1	CIA-1	End Semester examination
CO2	CIA-1	
CO3	CIA-2 Presentation, Quiz	
CO 4	CIA-2 Assignment	

Chairperson, BoS
Department of Microbiology
Osmania University, Hyd-07

HEAD
Department of Microbiology
Osmania University
Hyderabad-500 007.

b) Question Paper Pattern:

MICROBIAL PHYSIOLOGY
MODEL QUESTION PAPER - THEORY

Course Code: U24/MIC/DSC/201 **Max Marks: 60**
Credits: 4 **Time: 2 Hrs**

SECTION –A

I. Answer the following **4x10 =40 M**

1. Build in detail about the bacterial nutrition and nutrient uptake.
(OR)
2. How would you identify Chemolithotrophs and give a detail account of it?

3. How would you classify the different phases of bacterial growth curve with different types of microorganisms and environmental conditions.
(OR)
4. What can you write about the different methods involved in measurement of microbial growth?

5. How can you identify the various steps involved in EMP pathway?
(OR)
6. What is the original way to differentiate between Oxygenic and An-oxygenic photosynthesis with examples?

7. What conclusions can you draw between dissimilatory and assimilatory nitrate reduction?
(OR)
8. Compare and contrast between homo-lactic acid and Heterolactic acid fermentation.

SECTION –B

II. Answer any FOUR **4x5=20 M**

9. How would you organize and identify Phototrophs
10. What are Methanogens
11. Explain about Synchronous growth
12. Compare and contrast Halophiles
13. Construct the steps involved in ED pathway
14. Justify Pasteur effect

SECTION A - INTERNAL CHOICE **4Q X 10 M = 40 M**

Question Number	Module	Question	CO	BTL (Blooms Taxonomy Level)
1	Module 1	Build in detail about the bacterial nutrition and nutrient uptake.	CO 1	Level II, III
2	Module 1	How would you identify Chemolithotrophs and give a detail account of it.	CO 1	Level II, III
3	Module 2	How would you classify the different phases of bacterial growth curve with different types of microorganisms and environmental conditions.	CO 2	Level II
4	Module 2	What can you write about the different methods involved in measurement of microbial growth.	CO 2	Level II
5	Module 3	How can you identify the various steps involved in EMP pathway	CO 3	Level IV, V1
6	Module 3	What is the original way to differentiate between Oxygenic and Anoxygenic photosynthesis with examples.	CO 3	Level IV, V1
7	Module 4	What conclusions can you draw between dissimilatory and assimilatory nitrate reduction.	CO 4	Level IV
8	Module 4	Compare and contrast between homo-lactic acid and Hetero-lactic acid fermentation	CO 4	Level IV

SECTION B - ANSWER ANY 4 OUT OF 6 **4 Q X 5M = 20M**
(To compulsorily have **ONE** question from **each** module)

9	Module 1	How would you organize and identify Phototrophs	CO 1	Level III
10	Module 1	What are Methanogens	CO 1	Level II
11	Module 2	Explain about Synchronous growth	CO 2	Level II
12	Module 2	Compare and contrast Halophiles and Osmophiles	CO 2	Level II
13	Module 3	Construct the steps involved in ED pathway	CO 3	Level III
14	Module 4	Justify Pasteur effect	CO 4	Level IV

Chairperson, BoS
Department of Microbiology
Osmania University, Hyd-07

HEAD
Department of Microbiology
Osmania University
Hyderabad-500 007.

SEMESTER II
MICROBIAL PHYSIOLOGY –PRACTICAL

1. Course Description:

Course Code: U24/MIC/DSC/201/P

Course Type: DSC

No. of credits: 1

Max. Hours: 30

Hours per week:2

Max. Marks: 50

2. Course Objectives:

- To enable the students to understand the growth pattern and factors affecting bacterial growth by performing bacterial growth curve experiments.
- To equip and expose students to various culturing techniques for growth of specific microorganisms.

3. Course Outcomes:

CO 1: Measuring microbial growth, calculate growth kinetic parameters of steady state and continuous growth.

CO 2: Analyze the growth characteristics of the microorganisms capable of growing under different environmental conditions of temperature, oxygen, and solute and water activity.

List of Practicals

1. Enrichment culturing and isolation of phototrophs.
2. Culturing and isolation of chemoautotrophs- nitrifiers.
3. Study and plot the growth curve of *E. coli* by turbidometric method.
4. Determination and study of growth curve by standard plate count methods .
5. Calculation of generation time and specific growth rate of bacteria from the graph plotted with the given data.
6. Determination of viable count of bacteria.
7. Effect of temperature, pH and salt on growth of *E. coli.*
8. Effect of carbon and nitrogen sources on growth of *E.coli.*
9. Demonstration of the thermal death time and decimal reduction time of *E. coli.*
10. Cultivation of Anaerobic bacteria from dental samples and acne.
12. Study the growth pattern of Thermophiles and Alkaliphiles.

Chairperson, BoS
Department of Microbiology
Osmania University, Hyd-07

HEAD
Department of Microbiology
Osmania University
Hyderabad-500 007.

MODEL QUESTION PAPER – PRACTICAL

Course Code: U24/MIC/DSC/201/P
Course Type: DSC
No. of credits: 1

Max. Hours: 30
Hours per week: 2
Max. Marks: 50

I. MAJOR **20M**

1. *E.coli* culture inoculated into nutrient broth and incubated at different time intervals at 37°C , is provided to you. Measure the turbidity and plot the growth curve of the given culture. Calculate the generation time.

II. MINOR **10M**

2. An organism is subjected to different parameters. Note the O.D. Plot a graph and comment. pH / Temperature/Salt

(OR)

3. Observe the given culture plates which were exposed to different time intervals at 60°C and interpret the results based on the growth.

III. Identify the given spots (A-E) and write few significant points **5x2=10 M**

IV. Record **5M**

V. Viva **5M**

Prepared by Faculty	Checked &Verified by HoD	Approved by the Principal
Dr. Arsheen Tabassum	Dr. P. Roselin	Dr. Uma Joseph

Chairperson, BoS
Department of Microbiology
Osmania University, Hyd-07

HEAD
Department of Microbiology
Osmania University
Hyderabad-500 007.

St. FRANCIS COLLEGE FOR WOMEN, BEGUMPET, HYDERABAD-500016
(An Autonomous College Affiliated To Osmania University)
FACULTY OF SCIENCE- DEPARTMENT OF CHEMISTRY
PRACTICAL SYLLABUS CBCS-2024
SEMESTER -II
QUANTITATIVE ANALYSIS II
(Volumetric Analysis)

Program: B.Sc.
Course Code: U24/CHE/DSC/201/P
Course: DSC-2
No. of Credits: 1

Max. Hours: 20 Hrs
Max. Marks: 50
Hours per week: 2 Hrs

Course Objectives

- To develop analytical skills using the principles of quantitative analysis.

Course Outcomes

CO 1: Interpret and apply the principles of redox and complexometric titrations.

CO 2: Quantitative estimation of salts using gravimetric principles.

Volumetric Analysis

1. Estimation of Fe (II) ions by titrating it with $K_2Cr_2O_7$ using an internal indicator.
2. Estimation of Cu (II) ions using $Na_2S_2O_3$ with $K_2Cr_2O_7$ as primary standard.
3. Estimation of Iodine content in Iodized salt.
4. Estimation Nickel by back titration using $MgSO_4$.
5. Estimation of Zinc using EDTA.
6. Estimation of calcium or magnesium ions in milk.
7. Estimation of hardness of water.

References:

1. Vogel's Qualitative Inorganic Analysis, *Svehla, G.* Pearson Education, 2012.
2. J. Vogel's Quantitative Chemical Analysis, *Mendham,* Pearson, 2009.

Chairperson
Board of Studies in Chemistry
Dept of Chemistry
Osmania University, Hyd-07,

6. Syllabus Focus

a. Relevance to Local, Regional, National and Global Development Needs

Local /Regional/National /Global Development Needs	Relevance
local	In manufacturing processes, local energy production and storage techniques, production of solvents and other materials, drug formulation and dosage calculations.
Regional	Preparation of fertilizers impacting agriculture, metal refining process, food and pharmaceutical applications, useful for analytical techniques.
National	Optimizing the use of P - block elements, focus on electrochemical principles, preparation of polymers, phase transformations of various systems.
Global	Electronic industry, advancements in electrochemical technologies, sustainable industrial processes impacting the environment, formulation of solutions.

b. Components on Skill Development/Entrepreneurship Development/ Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Module No. 1	Encourage them to compare and discuss trends in reactivity and chemical behaviour
EMP	Module No. 2	Engage students in electrochemical cell design and analysis
ED	Module No. 3	Invite professionals or researchers who can share their insights from organic chemistry.
EMP	Module No. 4	Divide students into groups and share some real time applications.

Chairperson
Board of Studies in Chemi
Dept of Chemistry

7. Pedagogy

S. No.	Student Centric Methods Adopted	Type / Description of Activity
1.	Experiential Learning	Field trips
2.	Participative Learning	Presentations
3.	Problem solving	Case studies

8. Course Assessment Plan

a. Weightage of Marks in Continuous Internal Assessments and End Semester Examination

CO	Continuous Internal Assessments CIA - 40%	End Semester Examination-60%
CO1	CIA 1 written exam	Written Exam
CO2	CIA 2 (Quiz/Assignment/3D model making)	
CO3	CIA 1 written exam	
CO4	CIA 2 (Crossword/Problem solving/Assignment)	

Chairperson
Board of Studies in Chemistry
Dept of Chemistry
Osmania University, Hyd-07

b. Model Question Paper - End Semester Exam

St. FRANCIS COLLEGE FOR WOMEN, BEGUMPET, HYDERABAD-500016
(An Autonomous College Affiliated to Osmania University)
Faculty of Science – Department of Chemistry
MODEL PAPER
B. Sc. I YEAR SEMESTER -II

TIME: 2 hrs **Course Code: U24/CHE/DSC/201**
Max. Marks: 60 M

SECTION –A (Essay Questions)

I. Answer the following **4X10M=40 Marks**

1. a). Classify the oxides based on the oxygen content. (CO 1) **L1** 4M
   b). What are interhalogen compounds? Explain the structure of the AX5 type of molecule. (CO 1) **L1** 6M

OR

2. a). Discuss the structure of Diborane. (CO 1) **L2** 5M
   b). What are silicones? Classify them. (CO 1) **L1** 5M
3. a). Describe the Hittorf method for the determination of transport number (CO 2) **L2** 5M
   b) Explain Debye –Huckle's theory and the role of inter-ionic effect. (CO 2) **L2** 5M

OR

4. a) Explain the working and construction of S.H.E. (CO 2) **L2** 5M
   b) State Kohlrausch law of independent migration of ions and list out its applications. (CO 2) **L2** 5M
5. a) Give the mechanism of Nitration on Benzene. (CO3) **L1** 5M
   b) Write a note on directive influence of methyl group. (CO3) **L1** 5M

OR

6. Explain S_N1 and S_N2 reactions with their mechanism, stereochemistry, and energy profile diagram. (CO 3) **L2** 10M
7. a) What are azeotropes? Explain ethanol-water system. (CO 4) **L2** 5M
   b) State and explain Raoult's law with its limitations. (CO 4) **L2** 5M

OR

8. a) Justify that the chair form of cyclohexane is the most stable conformation. (CO4) **L4** 6M
   b) Define proper axis of symmetry. Illustrate with 2 examples. (CO4) **L1** 4M

SECTION – B (Short Answer Questions)

II. Answer any four **4x5=20 Marks**

9. Discuss the structure of XeO_3. (CO1) **L1**
10. Calculate the EMF of Cd, $Cd^{+2}//Cu^{+2}$, Cu E^0 (Cu^{+2}, Cu) = 0.34V.
    $E^0(Cd^{2+}, Cd)$ = -0.488 V. (CO 2) **L5**
11. How can you interpret aromatic character in a molecule? (CO3) **L5**
12. State and explain Henry's Law and its limitations. (CO 4) **L2**
13. Write a note on Williamson synthesis. (CO3) **L1**
14. What are carbides and give their classification. (CO1) **L1**

Chairperson
Board of Studies in Chem...
Dept of Chemistry
Osmania University, Hyd-07.

b. Model Question Paper - End Semester Exam

St. FRANCIS COLLEGE FOR WOMEN, BEGUMPET, HYDERABAD-500016
(An Autonomous College Affiliated to Osmania University)
Faculty of Science – Department of Chemistry
B. Sc. I YEAR SEMESTER -II

Time: 2 Hrs **Course Code: U24/CHE/DSC/201**
Max. Marks: 60M **Credits: 4**

SECTION A - INTERNAL CHOICE			**4 Q X 10 M = 40M**	
Question Number	**Question**		**CO**	**BTL**
1	**Module 1**	a)Classify the oxides based on the oxygen content. 4M b) What are interhalogen compounds? Explain the structure of AX_5 type of molecule. 6M **OR**	**CO 1**	**(Level II)**
2	**Module 1**	a) Discuss the structure of Diborane. 5M b)What are silicones? Classify them 5M	**CO 1**	**(Level II)**
3	**Module 2**	a) Describe the Hittorf method for the determination of transport number 5M b) Explain Debye –Huckle's theory and explain the role of inter-ionic effect. 5M **OR**	**CO 2**	**(Level II)**
4	**Module 2**	a) Explain the working and construction of S.H.E. 5M b) State Kohlrausch law of independent migration of ions and list out application 5M	**CO 2**	**(Level II)**
5	**Module 3**	a) Give the mechanism of Nitration on Benzene. 5M b) Write a note on directive influence of methyl group. 5M **OR**	**CO 3**	**(Level I)**
6	**Module 3**	Explain the hydrolysis of primary and tertiary alkyl halides with mechanism, stereochemistry and energy profile Diagram. 10M	**CO 3**	**(Level II)**

Chairperson
Board of Studies in Chem...
Dept of Chemistry
Osmania University, Hyd-07.

7	**Module 4**	a) What are azeotropes? Explain ethanol-water system. 5M b) State and explain Raoult's law with its limitations. 5M **OR**	**CO 4**	**(Level II)**
8	**Module 4**	a) Justify that the chair form of cyclohexane is the most stable conformation. 6M b) Define proper axis of symmetry. Illustrate with 2 examples. 4M	**CO 4**	**(Level IV)**
SECTION B – (Short answer questions) **ANSWER ANY 4 OUT OF 6** **4 X 5M = 20 M**				
9	**Module 1**	Discuss the structure of XeO_3	**CO 1**	**(Level I)**
10	**Module 2**	Calculate the EMF of $Cd,Cd^{+2}//Cu^{+2},Cu$ $E^0(Cu^{+2},Cu) = 0.34V$. $E^0(Cd^{2+},Cd) = -0.488V$.	**CO 2**	**(Level V)**
11	**Module 3**	How can you interpret aromatic character in a molecule?	**CO 3**	**(Level V)**
12	**Module 4**	State and explain Henry's Law and its limitations.	**CO 4**	**(Level II)**
13	**Module 3**	Write a note on Williamson synthesis.	**CO 3**	**(Level I)**
14	**Module 1**	What are carbides and give their classification.	**CO 1**	**(Level I)**

Chairperson
Board of Studies in Chemistry
Dept of Chemistry
Osmania University, Hyd-07.