## 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



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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



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## 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<br><br>Utilise the potential application of Methods of Solid Waste Management in the Waste management concerns<br><br>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<br><br>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 | | |



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**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<br>Head, Dept. of Environmental Studies | G. Dhanalakshmi,<br>Head, Dept. of Environmental Studies | Dr. Uma Joseph<br>Principal |



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## 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



CHAIR PERSON B.O.S.
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

## 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:**


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- 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:**

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- Environment Survey of the Environment published by The Hindu

**E-Resources:**

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



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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<br><br>Utilise the potential application of Methods of Solid Waste Management in the Waste management concerns<br><br>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<br><br>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 |
|---|---|---|
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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

## ANIMAL DIVERSITY - VERTEBRATES

1. **Course Description**

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

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

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

**No. of credits: 4**

2. **Course Objectives**

- Identify the various vertebrate classes and cites the examples of individual species that belong to them
- Describes the diversity and evolutionary relationship of vertebrates by integrating knowledge in comparative anatomy and physiology
- Understands the geographical distribution of common vertebrates and basic structural & functional aspects of Animal diversity

3. **Course Outcomes**

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

**CO1:** To understand and appreciate the study of significance of animal biodiversity.

**CO2:** To remember general characteristics of vertebrates.

**CO3:** To analyze the various adaptations in vertebrates and their basic differences among Amphibians, Reptiles, Birds and Mammals.

**CO4:** To apply the gained knowledge in comprehending the structural organization in vertebrates.



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**4. Course Content**

**Module I: Urochordata, Cephalochordata and Cyclostomata** **15 HRS**

1.1 Salient features of Urochordata

1.2 Retrogressive metamorphosis and its significance in Urochordata

1.3 Salient features and affinities of Cephalochordata; General characters of Cyclostomata

1.4 Comparison of the Petromyzon and Myxine

1.5 General characters and classification of Chordata upto orders with examples.

**Module II: Pisces & Amphibia** **15 HRS**

2.1 General characters of Fishes; Classification of fishes up to order level with examples

2.2 Scoliodon – Respiratory, Circulatory and Nervous system.

2.3 Types of Scales and types of Fins

2.4 General characters and Classification of Amphibians up to orders with examples.

2.5 Rana tigrina - Respiratory, Circulatory and Nervous system.

2.6 Parental care in amphibians; Neoteny and Paedogenesis.

**Module III: Reptilia & Aves** **15 HRS**

3.1 General characters of Reptilia; Classification of Reptilia up to orders with examples

3.2 Calotes – Respiratory system, Circulatory and Nervous system

3.3 Temporal fosse in reptiles and its evolutionary importance;

3.4 General characters of Aves; Classification of Aves up to orders with examples.

3.5 Columba livia - Digestive system,Circulatory systems, Respiratory system and Nervous system.

3.6 Migration in Birds; Flight adaptation in Birds

**Module IV: Mammalia** **15 HRS**

4.1 General characters of Mammalia

4.2 Classification of Mammalia up to orders with examples

4.3 Rabbit – Digestive system,Respiratory, Circulatory and Nervous system.

4.4 Dentition in mammals.

4.5 Aquatic adaptations in Mammals.

4.6 Flying adaptations in Mammals

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Osmania University, Hyd-07.

**5. References:**


1. E.L.Jordan and P.S. Verma 'Chordate Zoology' -. S. Chand Publications.
2. Mohan P.Arora. 'Chordata – I, Himalaya Publishing House Pvt.Ltd.
3. Marshal, Parker and Haswell 'Text book of Vertebrates'. ELBS and McMillan, England.
4. Alfred Sherwood Romer. Thomas S. Pearson 'The Vertebrate Body, Sixth edition, CBS college Publishing, Saunders College Publishing
5. J.W. Young, The Life of Vertebrates, 3rd ed, Oxford University press.
6. Harvey Pough F, Christine M. Janis, B. Heiser, Vertebrate Life, Pearson, 6th ed, Pearson Education Inc.2002.


PROFESSOR & HEAD
Department of Zoology
Osmania University, Hyd-07.

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**6.Syllabus Focus**

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

| Local /Regional/National /Global Development Needs | Relevance |
|---|---|
| National needs | Identifying priority areas for biodiversity is essential for directing conservation resources. Fundamentally, we must know where individual species live, which ones are vulnerable, where human actions threaten them, and their levels of protection. |
| Global development needs | To map global priority areas using the latest data on vertebrates. As conservation knowledge and threats change, it is essential it is reevaluate on global priorities. |

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**b)Components on Skill Development/Entrepreneurship Development/Employability**

| SD/ED/EMP | Syllabus Content | Description of Activity |
|---|---|---|
| Skill Development | Module II | Dissection techniques and structural organization in vertebrates |
| Entrepreneurship Development | Module III & IV | Adaptation and Conservation of Vertebrates |

**7. Pedagogy**

| S. No | Student Centric Methods Adopted | Type / Description of Activity |
|---|---|---|
| 1. | Experiential Learning | Field trips / Visit to Nehru Zoological Parks, Wild life sanctuaries. |
| 2. | Participative learning | Presentation / Ppt presentation on general topics. |
| 3. | Problem Solving learning | Awareness programmes / local activities of Conservation of Animals. |

**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 Test | Written Exam |
| CO2 | CIA-1 Written Test | |
| CO3 | CIA - 2 - Assignment | |
| CO4 | CIA - 2 - Objective test | |



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**b) Model Question Paper- End Semester Exam**

## ANIMAL DIVERSITY – VERTEBRATES
## MODEL PAPER - THEORY

**COURSE: DSC- II** **MAX MARKS: 60**
**SUBJECT CODE: U24/ZOO/DSC/201** **TIME: 2HRS**

**ILLUSTRATE WITH DIAGRAMS WHEREVER NECESSARY**

### SECTION-A

**I. Answer the following: -** **4 X 10 = 40 M**

1. Explain Retrogressive metamorphism and its significance in Urochordata

OR

2. Give characters of cyclostomata and discuss their phylogenetic status.

3. Describe the structure of Heart and course of blood circulation in Scoliodon.

OR

4. Discuss parental care in Amphibia with suitable examples.

5. Give an account of Heart , blood and course of circulation of Calotes

OR

6. Describe various modes of flight in birds.

7. Describe the structure and working of mammalian Heart. With a note on its automaticity

OR

8. Explain dentition in Mammals and add a note on development of a tooth.

### SECTION- B

**II. Answer any four questions** **4 X 5 = 20 M**

9. Salient features of Urochordata
10. Types of Scales
11. Neoteny
12. Temporal fossa in reptiles
13. Migration in Birds
14. Flying adaptations in Mammals



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PROFESSOR & HEAD
Department of Zoology, UCS,
Osmania University, Hyd-07.

## ANIMAL DIVERSITY - VERTEBRATES - MODEL PAPER THEORY

| SECTION A - INTERNAL CHOICE | | | 4 Q X 10 M = 40 M | |
|---|---|---|---|---|
| **Question Number** | **Question** | **Question** | **CO** | **BTL (Bloom's Taxonomy Level)** |
| 1 | Module 1 | Explain Retrogressive metamorphism and its significance in Urochordata | CO 1 | 2 |
| 2 | Module 1 | Give characters of cyclostomata and discuss their phylogenetic status | CO 1 | 2 |
| 3 | Module 2 | Describe the structure of Heart and course of blood circulation in Scoliodon | CO 2 | 2 |
| 4 | Module 2 | Discuss parental care in Amphibia with suitable examples | CO 2 | 1 |
| 5 | Module 3 | Give an account of Heart , blood and course of circulation of Calotes | CO 3 | 2 |
| 6 | Module 3 | Describe various modes of flight in birds. | CO 3 | 1 |
| 7 | Module 4 | Describe the structure and working of mammalian Heart. With a note on its automaticity | CO 4 | 4 |
| 8 | Module 4 | Explain dentition in Mammals and add a note on development of a tooth. | CO 4 | 4 |
| **SECTION B - ANSWER ANY 4 OUT OF 6** | | | **4 Q X5 M = 20 M** | |
| 9 | Module 1 | Salient features of Urochordata | CO 1 | 1 |
| 10 | Module 2 | Types of Scales | CO 2 | 1 |
| 11 | Module 3 | Neoteny | CO 3 | 3 |
| 12 | Module 4 | Temporal fosse in reptiles | CO 4 | 2 |
| 13 | Module 3 | Migration in Birds | CO 3 | 4 |
| 14 | Module 4 | Flying adaptations in Mammals | CO 4 | 4 |



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Board of Studies in Zoology,
Osmania University, Hyd-07.

PROFESSOR & HEAD
Department of Zoology, UCS
Osmania University, Hyd-07.

## ANIMAL DIVERSITY- VERTEBRATES
## PRACTICALS

**Programme: B.Sc.** **Max. Marks : 50**
**Type of course : DSC - II** **Hours per week : 2**
**CourseCode: U24/ZOO/DSC/201/P** **No. of credits : 1**

**Course Objective:**
To understand the basic structural & functional aspects of Animal diversity – Vertebrates

**Course Outcome:**
To identify and remember the various vertebrate specimens under study.
To evaluate the techniques learnt during dissections.

**Study of museum slides / specimens / models (Classification of animals up to orders)**

1. Protochordata: *Amphioxus, Amphioxus* T.S. through pharynx
2. Cyclostomata: *Petromyzon, Myxine, Ammocoetes larva*
3. Pisces: Sphyrna *Pristis, Torpedo, Pleuronectes, Hippocampus, Exocoetus, Echeneis, Labeo, Catla, Clarius, Anguilla, Protopterus*
4. Amphibia: *Ichthyophis, Amblystoma, Siren, Hyla, Rachophous,Bufo,Rana,* Axolotl larva
5. Reptilia : *Draco, Chameleon, Gecko, Uromastyx, Vipera russelli, Naja, Bungarus, Enhydrina, Typhlops, Testudo, Trionyx, Crocodilus, Ptyas.*
6. Aves: Archaeopteryx, *Passer, Psittacula, Bubo, Alcedo, Columba, Corvus, Pavo;* Collection and study of different types of feathers: Quill, Contour, Filoplume, Down
7. Mammalia: *Ornithorhynchus, Tachyglossus, Pteropus, Funambulus, Manis, Loris,* Hedgehog

**Osteology:**

1. Rabbit – Axial skeleton system (bones of Skull and Vertebral Column)
2. Pigeon and Rabbit – Appendicular skeleton system (bones of limbs and girdles)

**Dissections of *Labeo/Tilapia*: Brain, Weberian ossicles & V, VII, IX, X cranial nerves**

An "Animal album" containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

## ANIMAL DIVERSITY- VERTEBRATES
## PRACTICALS – MODEL PAPER

**Subject Code: U24/ZOO/DSC/201/P** **Max. Marks – 50**
**No. of Credits:1** **Time – 2 hour**

**I. Major Dissection** **14 M**

1. Dissect and display the Vth and VIIth Cranial Nerves of Labeo (OR)
2. Dissect and display the IXth and Xth Cranial Nerves of Labeo

**II. Minor Dissection** **6 M**

3. Dissect and display the Brain of Labeo (OR)
4. Dissect and display the Weberian Ossicle of Labeo

**III. Identify, classify, draw, label & write points of identification for the following spots (A-G).** **7x2 =14 M**

A. Protochordata: Amphioxus, Amphioxus T.S. through pharynx
B. Cyclostomata: Petromyzon, Myxine, Ammocoetus larva
C. Pisces: Sphyrna, Pristis, Torpedo, Pleuronectes, Hippocampus, Exocoetus, Echieneis, Labeo, Catla, Clarius, Auguilla, Protopterus
D. Amphibia: Ichthyophis, Amblystoma, Siren, Hyla, Rachophous, Bufo, Rana, Axolotallarva
E. Reptilia :Draco, Chemaeleon, Gecko, Uromastix, Vipera russelli, Naja, Bungarus, Enhydrina, Typhlops, Testudo, Trionyx, Crocodilus, Ptyas.
F. Aves: Archaeopteryx, Passer, Psittacula, Bubo, Alcedo, Columba, Corvus, Pavo; Collection and study of different types of feathers: Quill, Contour, Filoplume, Down
G. Mammalia: Ornithorhynchus, Tachyglossus, Pteropus, Funambulus, Manis, Loris,Hedgehog

**III. OSTEOLOGY- IDENTIFICATION OF BONES (H-J)** **2X2 = 4 M**

**IV. ANIMAL ALBUM** **5 M**

**V. RECORD** **5 M**

| Prepared by | Checked & Verified by | Approved by |
|---|---|---|
| Dr. Jyothi Rani M. | Dr. Jyothi Rani M. | |
| Name and Signature of the teaching faculty | Name and Signature of HoD DR. JYOTHI RANI | Name and Signature of Principal |



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PROFESSOR & HEAD
Department of Zoology, UCS.
Osmania University, Hyd-07.

SEMESTER - II

# ARCHEGONIATAE AND PALAEOBOTANY

## 1. Course Description

| | | | |
|---|---|---|---|
| **Program:** | **B. Sc** | **Max. Hours:** | **60** |
| **Course Code:** | **U24/ BOT/ DSC/201** | **Hours per week:** | **4** |
| **Type of Course:** | **DSC-2** | **Max. Marks:** | **60** |
| **No. of Credits:** | **4** | | |

## 2. Course Objectives

1. Discuss the morphology, structure and importance of the lower plants.
2. Review the meaning of scientific terms.

## 3. Course Outcomes

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

CO1: Assess the key characteristics, life cycles, structure, and reproduction of selected classes of bryophytes and trace the evolution of sporophyte.

CO2: Classify pteridophytes according to their distinguishing characteristics, and trace their evolutionary history.

CO3: Examine gymnosperm morphology, anatomy, and reproduction and discuss their economic significance.

CO4: Describe the different types of fossils, the geological time scale, and discuss the relevance of fossil pteridophytes & gymnosperms.

## 4. Course content

**Module I: Bryophytes** **14 Hours**

1.1 General Account: Origin of bryophytes; Amphibian nature, Classification up to class with diagnostic characters and examples, Range of thallus.

1.2 Morphology and Life-cycles of the following: *Marchantia, Anthoceros, Polytrichum.*

1.3 Phylogeny: Origin of Alternation of Generations (Homologous and Antithetic theory) Evolution of Sporophytes (Progressive and Regressive concept).

**Module II: Pteridophytes** **18 Hours**

2.1 General Account: Colonization and rise of early land plants.

2.2 Classification of vascular plants up to division with diagnostic characters and examples. Morphology and Life-cycles of the following: *Lycopodium, Equisetum & Marsilea*

2.3 Evolutionary trends – Heterospory and Origin of Seed habit. Stelar evolution. Telome concept and its significance in the origin of different groups of Pteridophytes.



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**Module III: Gymnosperms** **14 Hours**

3.1 Classification of Gymnosperms: General characteristics, classification (up to family).
3.2 Morphology and Life-cycles of the following: *Pinus* and *Gnetum*
3.3 Ecological and economic importance.

**Module IV: Palaeobotany** **14 Hours**

4.1 Fossil formation and types of fossils, Importance of fossil study. Geological time scale with dominant plant groups through ages.
4.2 Fossil Pteridophytes: Structural features, Geological distribution and evolutionary significance of *Rhynia*.
4.3 General account of Benettitales (Williamsoniaceae and Cycadeoidaceae).

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HYDERABAD-500 007

Head of the Department
St. Francis College,
Begumpet.

## 5. Reference Books


1. Watson, E. V. 1974. *The structure and life of Bryophytes,* B. I. Publications, New Delhi.
2. Pandey, B. P. 2006. *College Botany, Vol. II: Pteridophyta, Gymnosperms and Paleobotany.*S. Chand & Company Ltd, New Delhi.
3. Srivastava. H.N., 1993. *Introductory Botany Vol II.* Pradeep Publications, Jalandhar.
4. Vashishta, P. C., A. K. Sinha and Anil Kumar. 2006. *Botany - Pteridophyta (Vascular Cryptogams).* Chand & Company Ltd, New Delhi.
5. Singh, V., Pande, P.C and Jain, K.2008. *Diversity of Microbes and Cryptogams (4th Ed.),* Rastogi Publications, Meerut.
6. Pandey, B. P. 2001. *College Botany, Vol. I: Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta.* S. Chand & Company Ltd, New Delhi.
7. Pandey, B. P. 2007. *Botany for Degree Students: Diversity of Microbes, Cryptogams, Cell Biology and Genetics.* S. Chand & Company Ltd, New Delhi.
8. Vashishta, B. R., A. K. Sinha and Adarsha Kumar. 2008. *Botany for Degree Students: Bryophyta.* S. Chand & Company Ltd, New Delhi.
9. Vashishta, P. C., A. K. Sinha and Anil Kumar. 2006. *Botany for Degree Students: Gymnosperms*. Chand & Company Ltd, New Delhi.
10. Shukla A.C and S.P Misra, 1975. *Essentials of Paleobotany*, Vikas Publishing House Pvt.Ltd.,Delhi
11. Taylor T N, 1981. *Paleobotany: An Introduction to Fossil Plant Biology*. Ms. Graw Hill, New York.


Basavaiah
Head of the Department
St. Francis College,
Begumpet.

Sushma

A. Sabitha Rani
CHAIRPERSON
B.O.S. IN BOTANY
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 Development Needs | Archegoniates have wide range of ecological and economic value - for example<br>• Bryophytes - bioindicators of heavy metals in air pollution, material for seed beds, fuel, food, medicine, pesticides, nitrogen fixation, waste treatment etc<br>• Pteridophytes - food, shelter, medicine, biofertilizers, horticulture value etc.<br>• Gymnosperms - food, commercial wood, oil, medicine etc. |

**b) Components on Skill Development/Entrepreneurship Development/Employability**

| SD/ED/EMP | Syllabus Content | Description of Activity |
|---|---|---|
| SD | Module I: Bryophytes | Identification of few bryophytes based on morphological and anatomical characters (by observing slides and specimens) |
| | Module II: Pteridophytes | Identification of few pteridophytes based on morphological and anatomical characters (by observing slides, specimens and by taking anatomical sections) |
| | Module III: Gymnosperms | Identification of few gymnosperms based on morphological and anatomical characters (by observing slides, specimens and by taking anatomical sections) |

**Pedagogy**

| S. No | Student Centric Methods Adopted | Type / Description of Activity |
|---|---|---|
| 1. | Participative Learning | Presentations and Group discussions |
| 2. | Experiential Learning | Field Trips to research organizations / Botanical gardens |
| 3. | Problem solving | Research Projects |

**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 2 – Test 1: MCQ's, Quiz test or subjective | Written Exam |
| CO2 | CIA 1 - Subjective | |
| CO3 | | |
| CO4 | CIA 2 – Test 2: MCQ's or Presentation | |

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**b) Model Question Paper – End Semester Exam Theory**

## ARCHEGONIATAE AND PALAEOBOTANY

**Course Code: U24/ BOT/ DSC/201** **MAX MARKS: 60**

**Credits: 4** **TIME: 2 hours**

**Note: This question paper consists of Section A and B. The answer to Section A & B must be written in the answer book given.**

### SECTION – A (Long Essay Type)

**Answer ALL questions:** **Marks: 4 x 10 - 40**

1. Describe the structure of the Sporophyte of *Marchantia*.

OR

2. Explain the process of evolution of Sporophyte in Bryophytes.

3. Describe the internal structure of an *Equisetum* stem.

OR

4. Expalin the internal structure of *Marsilea* sporocarp.

5. Describe the morphology and anatomy of *Pinus* needle. Comment on its Xeric nature.

OR

6. Describe the primary structure and secondary growth in *Gnetum* stem.

7. What are fossils? Explain the types and process of fossil formation

OR

8. Outline the characteristic features of Benettitales.

### SECTION –B (Short Essay Type)

II. Write short notes on any **FOUR** of the following: **Marks: 4 x 5 - 20**

9. Explain the internal structure of *Anthoceros* thallus.
10. Describe the Strobilus of *Lycopodium*
11. Describe *Pinus* female cone.
12. Explain the methods of Compressions and petrifactions
13. Illustrate with examples on the Endangered gymnosperms.
14. Describe the Stelar Evolution.



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| SECTION A - INTERNAL CHOICE | | | | 4Q X 10 M = 40 M |
|---|---|---|---|---|
| Question Number | Question | Question | CO | BTL (Blooms Taxonomy Level) |
| 1 | Module 1 | Describe the structure of the Sporophyte of *Marchantia*. | CO 1 | Level I |
| 2 | Module 1 | Explain the process of evolution of Sporophyte in Bryophytes. | CO 1 | Level II |
| 3 | Module 2 | Describe the internal structure of an *Equisetum* stem. | CO 2 | Level I |
| 4 | Module 2 | Explain the internal structure of *Marsilea* sporocarp. | CO 2 | Level II |
| 5 | Module 3 | Describe the morphology and anatomy of *Pinus* needle. Comment on its Xeric nature. | CO 3 | Level I |
| 6 | Module 3 | Describe the primary structure and secondary growth in *Gnetum* stem. | CO 3 | Level I |
| 7 | Module 4 | What are fossils? Explain the types and process of fossil formation | CO 4 | Level I , Level II |
| 8 | Module 4 | Outline the characteristic features of Benettitales | CO 4 | Level II |
| SECTION B - ANSWER ANY 4 OUT OF 6<br>(To compulsorily have ONE question from each module) | | | | 4Q X 5 M = 20 M |
| 9 | Module 1 | Explain the internal structure of *Anthoceros* thallus. | CO 1 | Level II |
| 10 | Module 2 | Describe the Strobilus of *Lycopodium*. | CO 2 | Level I |
| 11 | Module 3 | Describe *Pinus* female cone. | CO 3 | Level I |
| 12 | Module 4 | Explain the methods of Compressions and petrifactions | CO 4 | Level II |
| 13 | Module 3 | Illustrate with examples on the Endangered gymnosperms. | CO 3 | Level II |
| 14 | Module 2 | Describe the Stelar Evolution. | CO 2 | Level I |

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### c) Question Paper Blueprint

| Modules | Hours Allotted in the Syllabus | COs Addressed | Section A (No. of Questions) | Total Marks | Section B (No. of Questions) | Total Marks |
|---|---|---|---|---|---|---|
| 1 | 14 | CO 1 | 2 | 10 each | 1 | 5 |
| 2 | 18 | CO 2 | 2 | 10 | 1 | 5 |
| 3 | 14 | CO 3 | 2 | 10 | 1 | 5 |
| 4 | 14 | CO 4 | 2 | 10 | 1 | 5 |

## 9. CO-PO Mapping

| CO | PO | Cognitive Level | Classroom sessions (hrs) |
|---|---|---|---|
| 1 | 1, 5 | Evaluate | 14 |
| 2 | 1, 2, 5 | Analysing | 18 |
| 3 | 1, 5, 7 | Analysing | 14 |
| 4 | 1, 2, 3, 5, 7, 8 | Understanding | 14 |

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# ARCHEGONIATAE AND PALAEOBOTANY

## Practical Syllabus

### 1. Course Description

| | | | |
|---|---|---|---|
| **Programme:** | **B. Sc** | **Max. Hours:** | **30** |
| **Course Code:** | **U24/ BOT/ DSC/201/P** | **Hours per week:** | **2** |
| **Type of Course:** | **DSC-2** | **Max. Marks:** | **50** |
| **No. of Credits:** | **1** | | |

### 2. Course Objectives

1. To develop critical understanding of the morphology and anatomy of archegoniate.
2. To acquire knowledge on few fossil plants.

### 3. Course Outcomes

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

CO 1: Examine the morphology, anatomy, reproduction and life cycle of Bryophyte types mentioned in the syllabus
CO 2: Examine the morphology, anatomy, reproduction and life cycle of Pteridophyte types mentioned in the syllabus
CO 3: Examine the morphology, anatomy, reproduction and life cycle of Gymnosperm types mentioned in the syllabus
CO 4: Devise Techniques to Preserve and Study Plant Materials

### 4. Course Content

1. Study of Morphology (vegetative and reproductive structures) and anatomy of the following Bryophytes: *Marchantia, Anthoceros* & *Polytrichum*.
2. Study of Morphology (vegetative and reproductive structures) and anatomy of the following Pteridophytes: *Lycopodium, Equisetum* and *Marsilea.*
3. Study of Anatomical features of *Lycopodium* stem, *Equisetum* stem and *Marsilea* petiole & rhizome by preparing double-stained permanent mount.
4. Study of Morphology (vegetative and reproductive structures) of the following taxa: Gymnosperms: *Pinus* and *Gnetum*
5. Study of Anatomical features of *Pinus* needle and *Gnetum* stem by preparing double-stained permanent mount.
6. Fossil forms using permanent slides / photographs: *Rhynia* and *Cycadeoidea.*
7. Brief study of the fossil deposits in India, Important Indian Paleobotanical Institutes and Contributions of Indian Paleobotanists - BirbalSahni.



Basanti. D
Head of the Department
St. Francis College,
Begumpet.

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**5. Model Question Paper – End Semester Exam Practical**

**ARCHEGONIATAE AND PALAEOBOTANY**

**Course Code: U24/ BOT/ DSC/201/P**

**Time: 2 Hours** **Maximum Marks: 50 Marks**

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**QI.** Prepare a single stain or double stain mount of the transverse section of the given material 'A'. Identify, classify, draw and describe the same.

Scheme for valuation: (slide preparation- 3; stains used-1; classification- 1; diagram-3; description –4

**12 marks**

**QII.** Identify the fossil '**B**' and describe with the help of a diagram.

Scheme for valuation: (Identification–1; diagram–2; description–2) **5 marks**

**QIII.** Identify, classify giving reasons with suitable diagrams of the given Specimens and slides. **C, D, E, F, G, H** **6 x 3 – 18 marks**

**QIV.** Seminar topic on study of the fossil deposits in India, Important Indian Paleobotanical Institutes and Contributions of Indian Paleobotanists-Birbal Sahni or Project. **10 marks**

**QV.** Record. **5 marks**

| Prepared by | Checked &verified by | Approved by |
|---|---|---|
| Basanti. Ch<br>**Dr. Basanti Chintapalli**<br>**Teaching faculty** | Basanti. Ch<br>**Dr. Basanti Chintapalli**<br>**HoD** | **Dr. Uma Joseph**<br>**Principal** |

Basanti. Ch
Head of the Dept.
St. Francis College,
Begumpet.

CHAIRPERSON
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OSMANIA UNIVERSITY
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**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

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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**

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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 – $\Delta G$, $\Delta H$ 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.

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**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.

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**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.

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## 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. |

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## 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) | |

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**b. Model Question Paper - End Semester Exam**

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**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**

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**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<br>b) What are interhalogen compounds? Explain the structure of $AX_5$ type of molecule. 6M<br>**OR** | **CO 1** | **(Level II)** |
| **2** | **Module 1** | a) Discuss the structure of Diborane. 5M<br>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<br>b) Explain Debye –Huckle's theory and explain the role of inter-ionic effect. 5M<br>**OR** | **CO 2** | **(Level II)** |
| **4** | **Module 2** | a) Explain the working and construction of S.H.E. 5M<br>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<br>b) Write a note on directive influence of methyl group. 5M<br>**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)** |

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| | | | | |
|---|---|---|---|---|
| 7 | **Module 4** | a) What are azeotropes? Explain ethanol-water system. 5M<br>b) State and explain Raoult's law with its limitations. 5M<br>**OR** | **CO 4** | **(Level II)** |
| 8 | **Module 4** | a) Justify that the chair form of cyclohexane is the most stable conformation. 6M<br>b) Define proper axis of symmetry. Illustrate with 2 examples. 4M | **CO 4** | **(Level IV)** |
| **SECTION B – (Short answer questions)**<br>**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)** |

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