SEMESTER - III

ANIMAL PHYSIOLOGY AND ANIMAL BEHAVIOUR

1. **Course Description**

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

Course Code:U24/ZOO/DSC/301 **Hours per week: 4**

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

No. of credits: 4

2. Course Objectives

- To enhance the knowledge on basics of various physiological systems in relation to their structures.
- To study the complex & diverse approaches of Animal Behaviour.

3. Course Outcomes

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

CO1: To study aspects of nutrition, excretion and osmoregulation in animals .

CO2: To analyze the animals homeostatic, respiration and circulation mechanisms.

CO3: To evaluate the processes of muscle contraction, nerve physiology and endocrine systems.

CO4: To analyze the various behavioral patterns in animals.

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4. Course Content

MODULE I: Digestion, Excretion & Osmoregulation **15 HRS**

1.1 DIGESTION

1.1.1 Enzymes: Definition, classification, inhibition, regulation.

1.1.2 Digestion of carbohydrates, proteins, lipids and cellulose

1.1.3 Absorption, assimilation of digested food

1.1.4 Role of gastrointestinal hormones in digestion

1.2 EXCRETION

1.2.1 Classification of animals on the basis of excretory products:Ammoniotelic, Uricotelic and Ureotelic

1.2.2 Structure and function of nephron

1.2.3 Urine formation counter current mechanism

1.3 OSMOREGULATION

1.3.1 Water and ionic regulation by fresh water animals

1.3.2 Water and ionic regulation Brackish water and marine water animals

Module II: Homeostasis, Respiration & Circulation **15 HRS**

2.1 HOMEOSTASIS

2.1.1 Concept of homeostasis

2.1.2 Mechanism of homeostasis

2.2 RESPIRATION

2.2.1 Definition of respiration, respiratory mechanism, external, internal and cellular Respiration

2.2.2 Respiratory pigments, transport of oxygen, oxygen dissociation curves, Bohr's effect, transport of carbon dioxide, chloride shift

2.3 CIRCULATION

2.3.1 Types of circulation: open and closed: Structure of mammalian heart

2.3.2 Types of hearts: neurogenic and myogenic

2.3.3 Heart functions and conduction.

2.3.4 Regulation of heartbeat, regulation of heart rate, Tachycardia and bradycardia

2.3.4 Blood clotting mechanism

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Module III: Muscle Contraction, Nerve Physiology & Endocrine System **15 HRS**

3.1 MUSCLE CONTRACTION

3.1.1 Types of muscles

3.1.2 Ultrastructure of skeletal muscle fibre

3.1.3 Sliding filament theory of muscle contraction mechanism and energetics

3.1.4 Twitch tetanus summation, Treppe fatigue

3.1 NERVE PHYSIOLOGY

3.1.1 Structure of neuron

3.1.2 Resting potential, threshold potential, action potential, conduction of nerve impulse

3.1.3 Transmission of nerve impulse

3.1.4 Synapse, synaptic transmission neurotransmitters EPSP, IPSP.

3.3 ENDOCRINE SYSTEMS

3.3.1 Endocrine glands- Structure, Secretion, Function and disorders of Pituitary gland, Thyroid gland, Parathyroid gland, Adrenal glands and pancreas.

3.3.2 Male and female hormones, hormonal control of menstrual cycle.

Module IV: Animal behavior **15 HRS**

4.1.1 Types of behavior, acquired and instinctive behavior, taxes, reflexes and tropisms

4.2.2 Learning and memory: Types of learning, trial and error learning, imprinting, habituation, Conditioning: classical conditioning, instrumental conditioning, examples of conditioning, Pavlov's Experiment.

4.3.3 Social behavior and communication: Colonial existence of bees and termites, pheromones.

4.4.4 Biological rhythms, biological clocks, circadian rhythms, circumlunar rhythms and circannual rhythms.

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5. References

1. Gerard J. Tortora and Sandra Reynolds Garbowski Principles of Anatomy and Physiology, Tenth Ed., John Wiley & Sons.
2. Arthur C. Guyton MD, A Text Book of Medical Physiology, Eleventh ed., John E. Hall, Harcourt Asia Ltd.
3. William F. Ganong, A Review of Medical Physiology, 22 ed, McGraw Hill, 2005.
4. Sherwood, Klandrof, Yanc, Human Physiology, Thompson Brooks/Coole, 2005.
5. Xnut Scmidt-Nieison, Animal Physiology, Sth ed, Cambridge Low Price Edition.
6. Roger Eckert and Randal, Animal Physiology, 4th ed, Freeman Co, New York.
7. Singh. H.R, Text Book of Animal Physiology and Biochemistry
8. Veer Bal Rastogi, Text Book of Animal Physiology
9. David McFarland, Animal Behaviour, Pitman Publishing Limited, London, UK.
10. Manning, A. and Dawkins, M. S, An Introduction to Animal Behaviour, Cambridge, University Press, UK.
11. John Alcock, Animal Behaviour, Sinauer Associate Inc., USA.
12. Paul W. Sherman and John Alcock, Exploring Animal Behaviour, Sinauer Associate Inc., Massachusetts, USA.

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6.Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Global development needs	To comprehend the scientific study of the life-supporting properties, functions and processes of animals or their parts in various animals.
Regional development needs	To provide a deeper understanding of how animals interact with each other and their environment.

b)Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
Skill Development	Module IV	To study various animal behavioral patterns.

7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Experiential Learning	Field Trips
2.	Participative Learning	Presentation
3.	Problem solving	Case studies Research Projects

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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 - I Written Exam	Written Exam
CO2	CIA - I Written Exam	
CO3	CIA - II Assignment	
CO4	CIA - II Objective test	

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b) Model Question Paper- End Semester Exam

ANIMAL PHYSIOLOGY AND ANIMAL BEHAVIOUR
MODEL QUESTION PAPER - THEORY

Course Code: U24/ZOO/DSC/301 **Max Marks: 60**
Credits: 4 **Time: 2Hrs**

ILLUSTRATE WITH DIAGRAMS WHEREVER NECESSARY

SECTION-A

I. Answer the following: - **10x4=40 M**

1. Define Digestion. Explain Carbohydrate digestion in detail.

OR

2. Explain the mechanism of Urine formation. Add a note on the counter current mechanism.

3. Define homeostasis. Explain the Mechanism of homeostasis.

OR

4. Explain the transport of respiratory gasses in detail.

5. What is Synapse and add a note on synaptic transmission.

OR

6. Explain the structure and functions of Thyroid gland.

7. What is behavior? Add a note on Social behavior.

OR

8. Explain different types of biological rhythms you have studied .

SECTION- B

II Answer any Four **5x4=20M**

9. Enzymes
10. Osmoregulation
11. Bradycardia & Tachycardia
12. Types of Muscles
13. Pheromones
14. Imprinting

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ANIMAL PHYSIOLOGY AND ANIMAL BEHAVIOUR
MODEL QUESTION 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	Define Digestion. Explain Carbohydrate digestion in detail.	CO 1	I
2	Module 1	Explain the mechanism of Urine formation. Add a note on the counter current mechanism.	CO 1	II
3	Module 2	Define homeostasis. Explain the Mechanism of homeostasis.	CO 2	III
4	Module 2	Explain the transport of respiratory gasses in detail.	CO 2	IV
5	Module 3	What is Synapse and add a note on synaptic transmission.	CO 3	V
6	Module 3	Explain the structure and functions of Thyroid gland.	CO 3	II
7	Module 4	What is behavior? Add a note on Social behavior.	CO 4	IV
8	Module 4	Explain different types of biological rhythms you have studied .	CO 4	I

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SECTION B - ANSWER ANY 4 OUT OF 6			4 Q X 5 M = 20 M	
11	Module 1	Enzymes	CO 1	I
12	Module 1	Osmoregulation	CO 1	IV
13	Module 2	Bradycardia and Tachycardia	CO 2	II
14	Module 3	Types of muscles	CO 3	I
15	Module 4	Pheromones	CO 4	V
16	Module 4	Imprinting	CO 4	III

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ANIMAL PHYSIOLOGY AND ANIMAL BEHAVIOUR

PRACTICALS

Program: B.Sc
Course: DSC- III
Subject Code: U24/ZOO/DSC/301/P

No. of Hrs allotted: 2 Hrs
Max Marks: 50
No. of Credits: 1

Course objective:

1. To enhance the knowledge on basics of various physiological systems in relation to their structures.
2. To study the complex & diverse approaches of Animal Behaviour.

Course outcome:

1. To apply the principles involved in qualitative analysis of biomolecules in the given sample.
2. To apply the concepts of behavioral patterns in studying the behavior of animals.

Syllabus:

1. Qualitative tests for identification of carbohydrates, proteins and lipids.
2. Qualitative tests for identification of Vitamin A and C.
3. Qualitative tests for identification of ammonia, urea and uric acid (Nitrogenous excretory products)
4. Study of permanent histological sections of Mammalian Endocrine glands - pituitary, parathyroid, thyroid, pancreas and adrenal gland.
5. Estimation of unit Oxygen consumption of crab with reference to body weight.
6. To study nests and nesting habits of the birds and social insects.
7. To study taxis (phototaxis, geotaxis, chemotaxis and hydrotaxis) behaviour in earthworm.
8. Habituation to touch in garden snail.

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ANIMAL PHYSIOLOGY AND ANIMAL BEHAVIOUR

PRACTICALS

MODEL QUESTION PAPER

Course Code: U24/ZOO/DSC/301/P **Max Time: 2 hrs**
Credits: 1 **Max. Marks: 50**

I. PERFORM THE QUALITATIVE TEST; WRITE THE PRINCIPLE, PROCEDURES, RESULTS FOR THE TESTS MENTIONED. **4 X 6=24 M**

(Procedure 1m; Experiment 4M; Observation & Inference 1 M)

1.Perform the Biuret test, Benedict's test ,Test for lipids, Test for Vitamin A on samples A, B , C&D.

2. Perform the Test with NaOH, Iodine test ,Nessler's reagent test & Test for Vitamin C on samples A, B , C&D.

3. Perform the Millon's test, Methylene blue test , Urease test & Test for Vitamin A on samples A, B ,C&D.

4. Perform the Xanthoproteic test, Molischtest , Test for Uric acid & Test for Vitamin C on samples A, B , C& D.

5. Perform the Lead acetate test, methylene blue test , Test for ammonia & Test for Vitamin A on samples A, B , C& D.

6. Estimate the of unit Oxygen consumption of crab with reference to body weight. Write the principle procedure results and inference.
(Experiment: 12 M; Principle: 2M; Procedure: 4M; Calculations: 2M; Results and Inference: 4M)

II. PERFORM THE EXPERIENT; WRITE THE PRINCIPLE, PROCEDURES, RESULTS

Experiment 7M; Principle 1M; Procedure 2m; Results 2M) **12 M**

1.To study the Phototactic behaviour in earthworms.

2. To study the Geotaxis behaviour in earthworms.

3. To study the Chemotaxis behaviour in earthworms.

4. To study the Hydrotaxis behaviour in earthworms.

5. To study the Habituation to touch in garden snail.

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III. IDENTIFY THE GIVEN SPOTS **3 X 3 = 9 M**

1. Endocrine glands
2. Different types of nests (birds)
3. Different types of nests (social insects)

IV. RECORD **5 M**

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Name and Signature of the teaching faculty	Dr. JYOTHI RANI Name and Signature of HoD	Name and Signature of Principal

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SKILL ENHANCEMENT COURSE I

BIOFERTILIZERS

1. Course Description

Programme:	**B. Sc**	**Max. Hours:**	**30**
Course Code:	**U24/BOT/SEC/301**	**Hours per week:**	**2**
Type of Course:	**SEC - 301**	**Max. Marks:**	**30**
No. of Credits:	**2**		

2. Course Objectives

1. Describe the role of bio-fertilizers and their mechanism of action in agriculture.
2. Apply the basic concepts of nitrogen fixing bacteria and mycorrhizal fungi for isolation, characterization, mass inoculum production as bio-fertilizers.

3. Course Outcomes

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

CO 1: Describe the role of microorganisms as biofertilizers and interpretation of the crop response of Azotobacter and blue green algae in rice cultivation
CO 2: Analyze the types of mycorrhizal fungi and the role of VAM in growth and crop yield and apply the concepts of organic farming in various biodegradable waste recycling processes.

4. Course Content

Module I **15 hours**

1.1 General account about the microbes used as biofertilizer - *Rhizobium* - isolation, identification, mass multiplication, carrier-based inoculants, Actinorrhizal symbiosis. *Azospirillum*: isolation and mass multiplication – carrier-based inoculant, associative effect of different microorganisms.

1.2 *Azotobacter*: classification, characteristics- crop response to *Azotobacter* inoculum, maintenance and mass multiplication.

1.3 Cyanobacteria (blue green algae), *Azolla* and *Anabaena azollae* association, nitrogen fixation, factors affecting growth, blue green algae and *Azolla* in rice cultivation.

Module II **15 hours**

2.1 Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield – colonization of VAM – isolation and inoculum production of VAM, and its influence on growth and yield of crop plants.

2.2 Green manuring and organic fertilizers, Recycling of biodegradable municipal, agricultural and Industrial wastes – biocompost making methods.

2.3 Types and method of vermicomposting including field Application.

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5. Reference Books

1. Dubey, R.C., 2005 A Textbook of Biotechnology S. Chand & Co, New Delhi.
2. Kumaresan, V. 2005, Biotechnology, Saras Publications, New Delhi.
3. John Jothi Prakash, E. 2004. Outlines of Plant Biotechnology. Emkay Publication, New Delhi.
4. Sathe, T.V. 2004 Vermiculture and Organic Farming. Daya publishers.
5. Subha Rao, N.S. 2000, Soil Microbiology, Oxford & IBH Publishers, New Delhi.
6. Vayas, S. C, Vayas, S. and Modi, H.A. 1998 Bio-fertilizers and organic Farming Akta, Prakashan, Nadiada

6. Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Regional needs	Biofertilizers play a pivotal role in regional development by enhancing agricultural productivity, promoting sustainable farming practices, and fostering environmental conservation.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Module 1	Isolation and mass cultivation of blue green algae for preparing as biofertilizer
	Module 2	Implementing the process of biodegradation technique and preparation of bio compost and vermicompost

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7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Participative Learning	• Presentations and Group discussions • Preparation of biocompost and vermicompost using the dry leaves
2.	Problem solving	• Minor projects • Reviewing research articles on syllabus topics

8. Course Assessment Plan

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

CO	Continuous Internal Assessments CIA -20%	End Semester Examination-30%
CO1	CIA 2 – Test 1: MCQ's, Quiz test	Written Exam
CO2	CIA 2 – Test 2: MCQ's / Presentation / Seminar topics	

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b) Model Question Paper – End Semester Exam Theory

BIOFERTILIZERS

Course Code: U24/ BOT/ SEC/301 **Max. Marks: 30**

Time: 1 Hour

Answer any FIVE of the following **5 x 6 – 30**

1. Justify the use of *Rhizobium sps*. for crop enhancement
2. Discuss the role of *Azotobacter* as biofertilizer
3. Explain the method of mass multiplication of *Azospirillum*
4. Recall the role of heterocyst in nitrogen fixation.
5. Outline the types of Mycorrhizae
6. Explain the process of inoculum production in VAM.
7. Assess the methodology of vermicomposting.
8. Categorize the various methods employed in making bio compost

Prepared by	Checked &verified by	Approved by
Dr. S. Revathi Teaching faculty	Dr. Basanti Chintapalli HoD	Dr. Uma Joseph Principal

Head of the Department
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SEMESTER - III
CHEMISTRY PAPER - III

1. Course Description

Programme: B.Sc.
Course Code: U24/CHE/DSC/301
Course Type: DSC
No. of credits: 4

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

2. Course Objectives

- To understand the nature and properties of d & f-block elements.
- To know the basic concepts of thermodynamics and to explain thermodynamic properties
- To classify organic molecules by their functional groups and identify fundamental properties associated with those functional groups
- To foster acquisition of knowledge on the concepts of solutions and phases of different systems.
- To acquire knowledge on qualitative analysis and apply practically.
- To learn structures of amino acids and proteins, synthesis and reactivity of amino acids.

3. Course Outcomes

CO1: Acquire knowledge about the properties of d & f-block elements and their separation techniques.
CO2: Describe the fundamental laws and concepts of thermodynamics.
CO3: Recognize functional groups in organic molecules and predict their reactivity through mechanisms.
CO4: Comprehend the concepts of Qualitative analysis, Phase rule, Amines and Amino acids.

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4. Course Content

MODULE I: INORGANIC CHEMISTRY 15 Hrs

d Block Elements **6 Hrs**

Chemistry of d-block elements: Characteristics of d-block elements with special reference to electronic configuration variable valency, ability to form complexes, magnetic properties. Determination of magnetic susceptibility using Guoy's balance & catalytic properties. Stability of various oxidation states and Standard reduction potential. Comparative treatment of second and third transition series with their 3d analogues. Study of Ti, Cr and Cu triads. Titanium triad – electronic configuration and reactivity of +3 and +4 states – oxides and halides. Chromium triad – reactivity of +3 and +6 states. Copper triad – reactivity of +1, +2 and +3 states.

Chemistry of f-block elements **5 Hrs**

Chemistry of Lanthanides: Position in periodic table, Electronic structure, oxidation state, ionic and atomic radii- lanthanide contraction- cause and consequences, anomalous behaviour of post lanthanides- complexation- type of donor ligands preferred. Magnetic properties-paramagnetism. Colour and spectra, f-f transitions –occurrence and separation – ion exchange method, solvent extraction. Chemistry of actinides- general features – electronic configuration, oxidation state, actinide contraction, colour and complex formation. Comparison with lanthanides.

Theories of bonding in metals **4 Hrs**

Valence bond theory, Explanation of metallic properties and its limitations, Free electron theory, thermal and electrical conductivity of metals, limitations, Band theory, formation of bands, explanation of conductors, semiconductors n-type and p-type, extrinsic & intrinsic semiconductors, and insulators.

MODULE II: PHYSICAL CHEMISTRY 15 Hrs

Thermodynamics **15 Hrs**

Definition of thermodynamic terms: system, surroundings, types of systems, intensive and extensive properties, state and path functions and their differentials. Thermodynamic processes, concept of heat & work. First law of thermodynamics-statement, definition of internal energy & enthalpy, Heat capacity, heat capacities at constant volume & pressure and their relationship. Joule's law, Joule Thomson coefficient and inversion temperature. Calculation of W, q, dU, dH for expansion of ideal gases under isothermal & adiabatic conditions for reversible process. Temperature dependence of Enthalpy- Kirchoff's equation.

Second law of thermodynamics, need for the law, different statements of the law. Carnot's cycle and its efficiency, Carnot theorem, thermodynamic scale of temperature concept of Entropy, Entropy as a state function, entropy changes in cyclic reversible and irreversible phase changes. Entropy as a function of V&T. Entropy as a function of P&T. Entropy change in physical processes.

Gibbs and Helmholtz functions: Gibbs function (G) & Helmholtz function (A) as thermodynamic quantities. A&G as criterion for thermodynamic equilibrium and spontaneity.

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Their advantage over Entropy change. Gibbs equations and Maxwell relations. Variation of G with P, V&T.

MODULE III: ORGANIC CHEMISTRY 15 Hrs

Carbonyl Compounds 7 Hrs

Aldehydes and ketones: Preparation: from acid chlorides, nitriles and 1,3-dithianes. Reactions – Reaction with HCN, $NaHSO_3$, ROH– hemiacetal and acetal formation, NH$_2$-G derivatives- (a) NH_2 (b) RNH_2 (c) NH_2OH (d) $PhNHNH_2$(e)2,4-DNP. Mechanisms of Iodoform test. Aldol Condensation, Cannizzaro's reaction, Wittig reaction, Benzoin condensation, Knoevenagel condensation, Reduction reactions (no mechanism required) Clemmensen reduction and Wolff Kishner reduction. Meerwein - Pondorff –Verley reduction. Oxidation: Baeyer – Villiger oxidation.

Carboxylic acids and their derivatives 5 Hrs

Carboxylic acids (aliphatic and aromatic)
Preparation: Acidic and Alkaline hydrolysis of esters (with mechanism). Hydrolysis of Nitriles. Reactions: (no mechanism required) Hell – Volhard – Zelinsky Reaction. Degradation of carboxylic acids by HunsDiecker reaction, Schmidt reaction (decarboxylation), Arndt – Eistert synthesis

Preparation: Acid chlorides, Anhydrides, Esters and Amides from acids and their interconversion. Reactions: Reformatsky Reaction (mechanism), Perkin condensation (mechanism).

Synthesis based on Carbanions 3 Hrs

Acidity of Alpha - Hydrogens, Preparation of Aceto-acetic ester by Claisen condensation and synthetic applications of Acetoacetic ester. A) Acid hydrolysis and ketonic hydrolysis. Preparation of i) monocarboxylic acids ii) dicarboxylic acids (iii) ketones (iv) Reaction with urea.

Malonic Ester-synthetic applications. Preparation of i) substituted mono carboxylic acids (ii) substituted dicarboxylic acids (iii). α, β. Unsaturated acids.

MODULE IV: GENERAL CHEMISTRY 15 Hrs

Phase Rule 5 Hrs

Statement and meaning of the terms – Phase, Component and Degrees of freedom, Gibbs Phase rule, phase equilibria of one component system – water system. Phase equilibria of two- component system – Solid-Liquid equilibria, simple eutectic –Pb-Ag system, desilverisation of lead. Solid solutions – compound with congruent melting point – Mg-Zn system and incongruent melting point – NaCl-H_2O system.

General Principles of Inorganic qualitative analysis (Semi-Micro Analysis) 3 Hrs

Anion analysis: Theory of sodium carbonate extract, classification and reactions of anions- CO_3^{2-} Cl^-, Br^-, SO_4^{2-}, PO_4^{3-}, BO_3^{3-}.CH_3COO^-, NO_3^-.

Cation Analysis: Principles involved - Solubility product, common ion effect, general discussion for the separation and identification of group I individual cations (Hg_2^{2+}, Ag^+, Pb^+)

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with flow chart and chemical equations. Principle involved in separation of group II & IV cations.

General discussion for the separation and identification of group II (Hg^{2+}, Pb^{2+}, Bi^{3+}, Cd^{2+}, Sb^{2+}), III (Al^{3+}, Fe^{3+}), IV ((Mn^{2+}, Zn^{2+}) individual cations with flow chart and chemical equations. Application of concept of hydrolysis in group V cation analysis. General discussion for the separation and identification of group V individual cations (Ba^{2+}, Sr^{2+}, Ca^{2+}) with flow chart and chemical equations. Theory of flame test. Identification of Group VI cations (Mg^{2+}, NH_4^+).

Amines (Aliphatic & Aromatic) **2 Hrs**

Nomenclature & Classification into primary, secondary & tertiary amines & quaternary ammonium compounds. Preparation- 1. ammonolysis of alkyl halides, 2. Gabriel synthesis, 3. Hoffmann's bromamide reaction (mechanism), reduction of amides & Schmidt reaction. Physical properties & basic character – Comparative basic strengths of NH_3, CH_3NH_2, $(CH_3)_2$ NH, $(CH_3)_3N$ & Aniline- Comparative basic strengths of aniline, N-Methylaniline & N,N-Dimethylaniline (in aqueous & non-aqueous media), steric effects & substituent effects. Use of amine salts as phase transfer catalysts. Chemical properties: a) alkylation, b) acylation c) Carbylamine reaction, d) Hinsberg separation, reaction with nitrous acid of 1°,2°,3°(aliphatic & aromatic amines). Electrophilic substitution of aromatic amines- bromination & nitration, oxidation of aryl & tertiary amines, diazotization.

Diazonium salts **2 Hrs**

Preparation & mechanism. Synthetic importance-replacement of diazonium group by OH, X(Cl)-Sandmeyer & Gattermann reaction, by fluorine (Schiemann reaction), By iodine, CN, NO_2, H & aryl groups. Coupling reaction of diazonium salts- with phenols and aromatic amines.

Amino acids **3 Hrs**

Classification: Amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples – Glycine, Alanine, valine and Leucine) by following methods: a) From halogenated Carboxylic acid b) Malonic ester synthesis c) Strecker's synthesis. Physical properties: Optical activity of naturally occurring amino acids: L – configuration, irrespective of sign of rotation. Zwitterion structure – salt like character, solubility, melting points, amphoteric character, definition of isoelectric point. Chemical properties: General reactions due to amino and carboxyl groups – Lactams from gamma and delta amino acids by heating peptide bond (amide linkage).

5. References:

1. Malik, W.U., Tuli G.D., and Madan, R.D. (2004). *Selected Topics in Inorganic Chemistry.* Ram Nagar, New Delhi: S. Chand and Company.
2. Puri, B.R., Sharma, L.R., Kalia, K.C., (2006). *Principles of Inorganic Chemistry.* Pitampura, Delhi: Vallabh Publications.
3. Bahl, A., &Tuli. (2009). *Essentials of physical chemistry: A textbook for B. Sc. classes as per UGC model syllabus* (Rev. multicolored.). New Delhi: S. Chand.
4. Bahl, A. and Bahl, B.S. (2011). *A Textbook of Organic Chemistry.* Ram Nagar, New Delhi: S. Chand and Company.

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5. Jain, M.K., and Sharma, S.C. (2011). *Modern Organic Chemistry*. Jalandhar, Delhi: Vishal Publishing Co.
6. Sharma, Y.R. (2012). *A Textbook of Complete Organic Chemistry*. Bangalore: Kalyani Publishers.
7. Principles of Inorganic Chemistry by Puri, Sharma and Kalia. Vishal Publications 1996.
8. Soni, P. (1979). *A textbook of physical chemistry* (11th ed.). New York: Academic Press.
9. Morrison R.T., Boyd, R.N., and Bhattacharjee S.K. (2011). *Organic Chemistry*. Delhi, Chennai, Chandigarh: Pearson.
10. Ferguson, L. (1966). *The Modern Structural Theory of Organic Chemistry*. New Delhi: Prentice-Hall of India Pvt.
11. Solomons, T., & Fryhle, C. (2008). *Organic chemistry* (9th edn.). Hoboken, NJ: John Wiley.
12. Sharma, Y.R. (2012). *A TextBook of Complete Organic Chemistry*. Bangalore: Kalyani Publishers.
13. Inorganic Chemistry by Shriver and Atkins 3rd edn Oxford Press 1999. Inorganic Chemistry Principles of structure and reactivity by James E. Huhey, E.A. Keiter and R.L. Keiter

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SEMESTER - III

SEC I: LAB REAGENTS AND LAB SAFETY IN CHEMISTRY

1. Course Description

Programme: BSc
Course Code: U24/CHE/SEC/301
Course Type: SEC
No. of credits: 2

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

2. Course Objectives

- To learn the safety rules and regulations to be followed while working in chemistry laboratory.
- To develop the skill of preparation of basic laboratory reagents.

3. Course Outcomes

This SEC paper will help students to enhance their overall skills in preparation and handling of various reagents in laboratory.

CO1: Gain knowledge and interpret various aspects while handling, and storage of various chemicals and calibrations with precautions.

CO2: Summarize the preparation of different lab reagents.

4. Course Content

Module- I: Laboratory Safety Rules and Regulations **15 Hrs**

General rules and regulations for lab safety: Minimizing Risks of Hazards, Personal Protective Equipment (PPE) - Hair, Dressing for the Laboratory, Eye Protection, Eyewash fountain, Gloves, Laboratory Protocols, Labelling Chemicals, Careful reading of labels Prevention of Inhaling Harmful Chemicals, Guide to Chemical Hazards, Chemical Spills etc. Accidents- use of fire extinguisher and first aid kit in the laboratory, safety symbols- Preparation of the charts by the students and display of charts in chemistry labs. Calibration of fractional weights, calibration of glassware - burette, pipette, standard flask, Normality/Molarity and specific gravity of concentrated acids – Preparation of dilute solutions (Numerical problems). Precautions to be taken in the preparation of dilute acids and bases and bases. Preparation of stock solutions of salts with specific examples. Properties of primary standard salt and preparation of standard solution. Good laboratory practices- maintenance of observation book records.

Module- 2: Preparation of Lab Reagents **15 Hrs**

Preparation of indicators and use of indicators in volumetric analysis- acid base titrations, redox titrations, precipitation titrations and complexometric titrations. Role of an indicator in detecting end point (Phenolphthalein, Methyl orange, Methyl-red, Potassium Chromate, Diphenylamine, EBT, Murexide, etc). Preparation of buffers – pH10 ammonical buffer and acetate buffer solutions. Preparation of commonly used reagents: Ammonium hydroxide solution, Ammonium molybdate reagent, Ammonium hydrogen phosphate solution, Bayer's reagent, Benedict's solution, Bromine water, Dimethylglyoxime reagent, 2,4-Dinitrophenyl hydrazine reagent, Eriochrome black-T reagent, Fehling solution, Ferric chloride solution, Ferrous sulphate solution, Iodine solution, Molisch's reagent, Nessler's reagent, Neutral $FeCl_3$, Schiff's reagent, Silver nitrate solution, Sodium carbonate solution , Sodium

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hydroxide (Caustic soda) solution, Starch solution, Tollen's reagent. (reference work and submission of assignments). Charts preparation depicting course content.

5. References

1. Vogel's Textbook of Quantitative Chemical Analysis, 5th edition.
2. Vogel's Textbook of macro and semimicro qualitative inorganic analysis. G. Svehla, 5th edition.
3. Chemistry Reagent Manual Prepared by Chemistry Department, SGTB Khalsa College under DBT's Star College Scheme, University of Delhi (Available: online)
4. American Chemical Society Safety in Academic Chemistry Laboratories 8th edition

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Department of Chemistry
UCS, Osmania University
Hyderabad-500 007.

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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	Knowledge of the basic rules for calibration of instruments and glassware.
Regional	Learn about the concepts involved in preparation of basic laboratory reagents.
National	Acquisition of new horizons in skill development and employability.
Global	A complete idea of rules, regulations and methods for preparation of reagents increases a student's inclination towards the subject.

b. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	**Module1** Laboratory Safety Rules and Regulations.	This enhances their skill development and employability in the field of chemistry, cosmetology and pharmacy.
EMP		
SD	**Module 2** Preparation of Lab Reagents	To prepare and check the quality parameters of the various laboratory reagents.
ED		
EMP		

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7. Pedagogy

S. No.	Student Centric Methods Adopted	Type / Description of Activity
1.	Field trips, Internship Opportunities	Students are taken to various institutes like IICT, HCU, IITH, ARCI, Pharma Patashala etc
2.	Seminars/ workshops/ research projects	Students are allowed to participate in seminars and workshops organized in and outside the college. They are encouraged to take up research projects.

8. Course Assessment Plan

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

Continuous Internal Assessments CIA -40%	End Semester Examination- 60%
CIA- 20 Marks	Written Exam 30 Marks

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Hyderabad-500 007.

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b. Model Question Paper- End Semester Exam

St. FRANCIS COLLEGE FOR WOMEN BEGUMPET HYDERABAD – 500 016
(An Autonomous College Affiliated To Osmania University)
CHEMISTRY
Model Paper
B.Sc. II - Semester III
SKILL ENHANCEMENT COURSE I
LAB REAGENTS AND LAB SAFETY IN CHEMISTRY

Time: 1 Hr **Course Code: U24/CHE/SEC/301**
Max. Marks: 30

Answer any six questions

5 x 6 = 30 Marks

1. Summarize the personal protective equipment. (**L2**)
2. Explain the preparation and properties of standard solutions. (**L2**)
3. Describe how calibration of glassware is carried on. (**L2**)
4. Outline the procedure to prepare 2,4-Dinitrophenyl hydrazine reagent, and Eriochrome black-T reagent. (**L1**)
5. Emphasize the role of Phenolphthalein and Diphenylamine indicators in detecting the end point of a reaction. (**L3**)
6. Write a note on ammonical and acetate buffer solutions. (**L2**)
7. Discuss the steps involved in the preparation of Tollens, Fehling's and Benedict's reagents. (**L1**)

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CHEMISTRY
Model Paper
B.Sc. II - Semester III
SKILL ENHANCEMENT COURSE I
LAB REAGENTS AND LAB SAFETY IN CHEMISTRY

Time: 1 Hr **Course Code: U24/CHE/SEC/301**
Max. Marks: 30

SECTION A - Answer any six questions **6 x 5 = 30 Marks**

Question Number	Question		CO	BTL
1	Module 1	Summarize the personal protective equipment.	CO 1	Level 2
2	Module 1	Explain the preparation and properties of standard solutions.	CO 1	Level 2
3	Module 1	Describe how calibration of glassware is carried on.	CO 1	Level 2
4	Module 2	Outline the procedure to prepare 2,4-Dinitrophenyl hydrazine reagent, and Eriochrome black-T reagent.	CO 2	Level 1
5	Module 2	Emphasize the role of Phenolphthalein and Diphenylamine indicators in detecting the end point of a reaction.	CO 2	Level 3
6	Module 2	Write a note on ammonical and acetate buffer solutions.	CO 2	Level 2
7	Module 2	Discuss the steps involved in the preparation of Tollens, Fehling's and Benedict's reagents.	CO 2	Level 1

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SEMESTER - III

POULTRY & ANIMAL HUSBANDRY

1. **Course Description**

Programme: B.Sc. **Max. Hours: 30**

Course Code:U24/ZOO/SEC/301 **Hours per week: 2**

Course Type: SEC -I **Max. Marks: 50**

No. of credits: 2

2. Course Objectives

- To develop the overall skill development of poultry farm management operations.
- To understand animal husbandry practices.

3. Course Outcomes

CO1: To impact knowledge on different systems of breeding, selection method, design and implementation of breeding programmes in developing a healthy poultry industry.

CO2: To organize knowledge on animal husbandry, its prospects, practices and management techniques of dairy animals.

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4. Course Content

MODULE I: Poultry **15 HRS**

1.1 Poultry - present status and future prospects

1.2 Methods of Housing - Housing of chicks in floor and cages, Housing growers in cages and floor, Housing of layers on floor and cages, slatted floor

1.3 Importance of nutrition in poultry production - Classification of food stuffs and their categorization into energy feeds, protein feeds, minerals and vitamins

1.4 Common diseases of poultry and their causative agents, symptoms and treatment

(i) Viral diseases - Ranikhet disease, Fowl pox, EDS-76 (Egg Drop Syndrome), infection of bursal disease (gumboro disease)

(ii) Bacterial diseases - Colibacillosis, Salmonellosis

(iii) Fungal diseases - Aspergillosis

(iv) Parasitic diseases - Tapeworm, Coccidiosis

1.5 Vaccination procedures for broilers, broiler breeders, commercial layers, turkey, duck breeders and commercial ducklings.

MODULE II : Animal Husbandry **15 HRS**

2.1 Introduction to dairy farming in India and its present and future prospects.

2.2 Dairy farm- Water supply, Light, Ventilation, Drainage system, Maintenance of recycling of waste and hygienic conditions of farm.

2.3 Study of general management practices of animals: Grooming, Drying off, control of bad habits, castration, deworming, trimming.

2.4 Cattle and Buffalo management - Calf raising, management of pregnant, parturient, lactating and dry cows, buffalos and breeding bulls, summer management of buffalo.

2.5 Sheep and Goat management Management of Lambs and kids, Management of pregnant, parturient and lactating doe, General management practices of pigs.

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Osmania University, Hyd-07.
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Department of Zoology, UCS,
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5.References:

1. Poultry Science and practice - Nilotpal Ghosh, CBS publisher
2. Poultry production and Management - Jagadeesh Prasad, Kalyani publisher
3. A text book of Animal husbandry - C. C. Banjer Joe, IBH publishing
4. A text book of Animal husbandry - S. K. Kaushish, Kalyani publisher

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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 development needs	To meet the nutritional demand of quality organic eggs and meat requirements.

b)Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	**Syllabus Content**	**Description of Activity**
Entrepreneurship Development	Module I- II	Educational Visit to poultry and dairy farms to inculcate entrepreneurship skills.

7. Pedagogy

S. No	**Student Centric Methods Adopted**	**Type / Description of Activity**
1.	Experiential Learning	Field Trips
2.	Participative Learning	Presentation
3.	Problem solving	Case Studies

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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 - I Assignment	Written Exam
CO2	CIA - II Objective test	

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b) Model Question Paper- End Semester Exam

POULTRY & ANIMAL HUSBANDRY -MODEL QUESTION PAPER

THEORY

Course Code: U24/ZOO/SEC/301 **Max Marks: 30**

Credits: 2 **Time: 1 Hr**

ILLUSTRATE WITH DIAGRAMS WHEREVER NECESSARY

SECTION-A

I. Answer any five out of seven given questions. **5 x 6 = 30 M**

1. Define poultry. Write a note on its present status and future prospects.
2. Classify the common viral diseases affecting poultry.
3. Write a note on the different methods of housing in the poultry industry.
4. Describe the various vaccination procedures for broilers and commercial layers.
5. What is dairy farming? Analyze the present and future prospects of dairy farming in India.
6. Explain the study of general management practices of animals.
7. What are the general management practices of pigs?

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POULTRY & ANIMAL HUSBANDRY -MODEL QUESTION PAPER

THEORY

SECTION A - INTERNAL CHOICE			5 Q X 6 M = 30 M	
Question Number	**Question**	**Question**	**CO**	**BTL(Bloom's Taxonomy Level)**
1	Module 1	Define poultry. Write a note on its present status and future prospects.	CO 1	I
2	Module 1	Classify the common viral diseases affecting poultry	CO 1	II
3	Module 1	Write a note on the different methods of housing in the poultry industry.	CO 1	II
4	Module 1	Describe the various vaccination procedures for broilers and commercial layers.	CO 1	IV
5	Module 2	What is dairy farming? Analyze the present and future prospects of dairy farming in India.	CO 2	IV
6	Module 2	Explain the study of general management practices of animals.	CO 2	V
7	Module 2	What are the general management practices of pigs?	CO 2	IV

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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 -III
QUALITATIVE ANALYSIS
(Semi-micro Analysis)

Program: B.Sc. Max. Hours: 20 Hrs

Course Code: U24/CHE/DSC/301/P Max. Marks: 50

Course: DSC-3 Hours per week: 2 Hrs

No. of Credits : 1

Course Objectives

- To study the systematic analysis of anions and cations in an inorganic salt mixture

Course Outcomes

CO 1: Apply the principles of common ion effect and solubility product in Semi micro qualitative analysis.
CO 2: Analyse and report ions in a mixture of salts based on their chemical reactions with group reagents

Qualitative Analysis - Semi micro analysis of mixtures: Analysis of two anions (one simple, one interfering) and two cations in the given mixture.

Anions: CO_3^{2-}, S^{2-}, SO_3^{2-}, CH_3COO^-, Cl^-, Br^-, I^-, NO_3^-, SO_4^{2-}, PO_4^{3-}, BO_3^{3-}

Cations: NH_4^+, Pb^{2+}, Ag^+, Bi^{3+}, Cu^{2+}, Cd^{2+}, Sn^{2+}, Fe^{3+}, Al^{3+}, Cr^{3+}, Co^{2+}, Ni^{2+}, Mn^{2+}, Zn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, Mg^{2+}

References:

1. Svehla, G, *Vogel's Qualitative Inorganic Analysis*, Pearson Education, 2012.
2. Gurdeep R. Chatwal, *College Practical Chemistry-II*, Himalaya Publishing House, 2005.

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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	Knowledge of the basic principles of Chemistry to help in day-to-day life.
Regional	To Learn about basic concepts of d and f block elements
National	Application of principles of qualitative analysis in identifying Functional groups /in identifying anions and cations in Salt mixture
Global	Various organic synthetic procedures learnt by students incline them towards research, enable them to synthesize Novel organic compounds with Multiple application

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

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Module 2	Deriving equations, solving theoretical problems and interpreting results
ED	Module 4	Qualitative analysis of Metal ions is extensively in Analytical research laboratories in testing Purity of samples
EMP	Module 3	The various organic synthetic procedures learnt by students are widely applicable in industries thus increasing their employability

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7. Pedagogy

S. No.	Student Centric Methods Adopted	Type / Description of Activity
1	Experiential	Experiments, attending seminars/workshops and field visits
2	Participative	Group discussion, quiz, presentations etc.
3	Problem solving	Solving problems in Physical Chemistry and elucidation of mechanisms in Organic Chemistry.

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	CIA1 -Written Exam	Written Exam
CO2	CIA 1 -Written exam	
CO3	CIA 2: poster/powerpoint presentation, collage, 3D model making, problem solving and quiz.	
CO4	CIA 2: poster/powerpoint presentation, collage, 3D model making, problem solving and quiz.	

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b. Model Question Paper - End Semester Exam

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(An Autonomous College Affiliated to Osmania University)
Faculty of Science – Department of Chemistry
MODEL PAPER
B.SC. II YEAR SEMESTER -III

TIME: 2hrs **Course Code**: U24/CHE/DSC/301
Max. Marks: 60

SECTION –A (Essay Questions)

I. Answer the following **4X10=40 Marks**

1. a) What is Lanthanide contraction? Explain its Consequences. (CO1) **L2** 5M
   b) Explain Free electron theory of Metallic bonding. (CO1) **L1** 5M

OR

2. What are Transition elements? Explain the general properties with reference to Complex formation, magnetic properties and variable oxidation states. (CO1) **L1** 10M
3. a) Derive an expression for Work done in reversible isothermal expansion of an ideal gas. (CO2) **L3** 5M
   b) Show that for one mole of an ideal gas Cp-Cv = R (CO2) **L3** 5M

OR

4. Describe in detail the Carnot cycle. (CO2) **L2** 10M
5. a) Elucidate the mechanism of Aldol condensation. (CO3) **L2** 5M
   b) Explain the Reaction mechanism for Wittig Reaction. (CO3) **L2** 5M

OR

6. a) Explain Perkin's Condensation with a suitable mechanism. (CO3) **L2** 5M
   b) What is Claisen condensation? Give the mechanism. (CO3) **L2** 5M
7. a) Illustrate one component system with a phase diagram. (CO4) **L2** 5M
   b) What is the Common ion effect? Discuss its application in the separation of cations. (CO4) **L2** 5M

OR

8. a) Explain Hoffmann Bromamide reaction with Mechanism. (CO4) **L2** 5M
   b) How are valine and glycine synthesized by Strecker's synthesis? (CO4) **L3** 5M

SECTION – B (Short Answer Questions)

II. Answer any FOUR questions. **4×5 =20 Marks**

9. Describe the separation of lanthanides using the ion exchange method. (CO1) **L2**
10. Prove that Joule Thomson effect is an isenthalpic process. (CO2) **L3**
11. Calculate the work done in an isothermal reversible expansion of one mole of an ideal gas at 27°C from a volume of 10dm^3 to 20dm^3. (CO2) **L4**
12. Explain Hell Volhard Zelensky (HVZ) reaction with suitable examples. (CO3) **L2**
13. Define terms a) component b) degrees of freedom c) eutectic point. (CO4) **L1**
14. What is a Solubility product? Explain why Zn^{+2} ions do not precipitate when H_2S is added in Group II. (CO4) **L1**

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b. Model Question Paper - End Semester Exam

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(An Autonomous College Affiliated to Osmania University)
Faculty of Science – Department of Chemistry
B.SC. II YEAR SEMESTER -III

TIME: 2hrs **Course Code: U24/CHE/DSC/301**
Max. Marks: 60 **Credits: 4**

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

Question Number	Question		CO	BTL
1	Module 1	a) What is Lanthanide contraction? Explain its Consequences. 5M b) Explain Free electron theory of Metallic bonding. 5M **OR**	CO 1 CO1	Level II Level I
2	Module 1	What are Transition elements? Explain the general properties with reference to Complex formation, magnetic properties and variable oxidation states. 10M	CO 1	Level I
3	Module 2	a) Derive an expression for Work done in reversible isothermal expansion of an ideal gas. 5M b) Show that for one mole of an ideal gas Cp-Cv = R 5M **OR**	CO 2 CO2	Level III Level III
4	Module 2	Describe in detail the Carnot cycle. 10M	CO 2	Level II
5	Module 3	a) Elucidate the mechanism of Aldol condensation. 5M b) Explain the Reaction mechanism for Wittig Reaction.5M **OR**	CO 3 CO 3	Level II Level II
6	Module 3	a) Explain Perkin's Condensation with a suitable mechanism. 5M b) What is Claisen condensation? Give the mechanism. 5M	CO 3 CO 3	Level II Level II
7	Module 4	a) Illustrate one component system with a phase diagram. 5M	CO 4 CO 4	Level II Level II

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		b) What is the Common ion effect? Discuss its application in the separation of cations. 5M **OR**		
8	**Module 4**	a) Explain Hoffmann Bromamide reaction with Mechanism. 5M b) How are valine and glycine synthesized by Strecker's synthesis? 5M	**CO 4** **CO 4**	**Level II** **Level III**

SECTION B – (Short answer questions)

SECTION B - ANSWER ANY 4 OUT OF 6 **4 X 5 = 20 M**

9	**Module 1**	Describe the separation of lanthanides using the ion exchange method.	**CO 1**	**Level II**
10	**Module 2**	Prove that Joule Thomson effect is an isenthalpic process.	**CO 2**	**Level III**
11	**Module 2**	Calculate the work done in an isothermal reversible expansion of one mole of an ideal gas at 27°C from a volume of $10dm^3$ to $20dm^3$.	**CO 2**	**Level IV**
12	**Module 3**	Explain Hell Volhard Zelensky (HVZ) reaction with suitable examples.	**CO 3**	**Level II**
13	**Module 4**	Define terms a) component b) degrees of freedom c) Eutectic point.	**CO 4**	**Level I**
14	**Module 4**	What is a Solubility product? Explain why Zn^{+2} ions do not precipitate when H_2S is added in Group II.	**CO 4**	**Level I**

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CBCS 2024

SEMESTER - III

TAXONOMY, MEDICINAL BOTANY & ECOLOGY

1. Course Description

Program:	**B. Sc**	**Max. Hours:**	**60**
Course Code:	**U24/ BOT/ DSC/301**	**Hours per week:**	**4**
Type of Course:	**DSC-3**	**Max. Marks:**	**60**
No. of Credits:	**4**		

2. Course Objectives

1. Explain various plant families, their economic importance and to encourage the sustainable cultivation and collection of medicinal plants of good quality.
2. Compare the two interacting components of the ecosystem in which organisms interact. (Biotic and abiotic) and explain the hierarchy formed by ecological systems.

3. Course Outcomes

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

CO1: Examine the principles and methods of categorization and nomenclature while recognizing the significance of the herbarium techniques and role of ICBN.

CO2: Recognize members of the major families of angiosperms by examining their diagnostic characteristics and economic significance, and analyze the most recent advances in taxonomy.

CO3: Interpret the scope of Ethnomedicine; acquire an increased awareness of plants & plant products that are a part of daily life and describe the methods of evaluation of crude drugs.

CO4: Describe the hierarchy of various ecosystems and summarise the basic concepts of production and community ecology

4. Course content

Module I: Systematics **10 Hours**

1.1 Introduction: Principles of plant Systematics, Systematics vs Taxonomy, types of classification: Artificial, Natural and Phylogenetic.

1.2 Systems of classification: Salient features and comparative account of Bentham and Hooker and Engler and Prantl. An introduction to Angiosperm Phylogeny Group.

1.3 Nomenclature and Taxonomic resources: An introduction to ICBN, Vienna code – a brief account. Herbarium: Concept, techniques and applications.

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Begumpet.

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Module II: Taxonomic Families **17 Hours**

2.1 Systematic study and economic importance of plants belonging to the following families: Annonaceae, Capparidaceae, Rutaceae, Fabaceae, Caesalpiniaceae, Mimosaceae, Cucurbitaceae and Apiaceae.

2.2 Asteraceae, Asclepiadaceae, Lamiaceae, Amaranthaceae, Euphorbiaceae, Orchidaceae and Poaceae.

2.3 Current concepts in Angiosperm Taxonomy: Embryology in relation to taxonomy, cytotaxonomy, Chemotaxonomy and Numerical Taxonomy.

Module III: Medicinal Plants **18 Hours**

3.1 Ethnomedicine: Scope and interdisciplinary nature. Outline of Ayurveda, Siddha, Unani and Homoeopathic systems of traditional medicine.

3.2 Plants in primary health care: Common medicinal plants – Tippateega (*Tinospora cordifolia*), Tulasi (*Ocimum sanctum)*, Brahmi (*Bacopa monnieri*), Karaka (*Terminalia chebula*), Kalabandha (*Aloe vera*), Turmeric (*Curcuma longa*), Nelausiri (*Phyllanthus amarus*), Amla (*Phyllanthus emblica*), Aswagandha (*Withania somnifera*), Sarpagandha (*Rauwolfia serpentina*).

3.3 Adulteration of crude drugs and methods of identification – some examples. Plant crude drugs: types, methods of collection, processing and storage practices. Evaluation of Crude drugs.

Module IV: Ecology **15 Hours**

4.1 Plants and environment: Ecological factors- climatic (light and temperature), edaphic and biotic. Ecological adaptations of plants. Concept and components of Ecosystem. Energy flow, food chains, food webs, ecological pyramids.

4.2 Production ecology: Concepts of productivity, GPP, NPP, CR (Community Respiration) and secondary production, P/R ratio and ecosystems.

4.3 Community ecology: Frequency, density, cover, life forms, biological spectrum, ecological succession (Hydrosere and Xerosere). Population ecology: Natality, mortality, growth curves, ecotypes, ecads.

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St. Francis College,
Begumpet.

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5. Reference Books

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

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6. Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Global development need	Understanding medicinal plants gives an idea about their traditional uses and also the need of conserving medicinal plant biodiversity, which is considered important on a global scale.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Module I: Systematics	Understanding the technique of Herbarium preparation for various plants
	Module II: Taxonomic families	Plant Identification using floral characters through flower dissection
	Module III: Medicinal plants	Identification of few medicinal plants with their morphological characters and evaluation of crude drugs through their physical and chemical characters

Head of the Department
St. Francis College,
Begumpet.

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7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Participative Learning	• Presentations and Group discussions • Reading and gathering information from library
2.	Experiential Learning	• Field book preparation with flora in the college / Field trip • Herbarium preparation (25 twigs)
3.	Problem solving	• Research Projects • Reviewing research articles on syllabus topics

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 / Presentation / Seminar topics	

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b) Model Question Paper – End Semester Exam Theory

TAXONOMY, MEDICINAL BOTANY & ECOLOGY

Course Code: U24/ BOT/ DSC/301 **MAX MARKS: 60**

Credits: 4 **TIME: 2 hours**

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

Section A (Long Essay Type)

I. Answer all Questions **Marks 4 x 10 - 40**

1. Outline the Bentham and Hooker system of classification and list its merits and demerits

OR

2. Describe in detail and discuss about ICBN.

3. Explain in detail the general characters of the family Asteraceae.

OR

4. Explain Chemotaxonomy.

5. Describe the biological source, chemical constituents and medical significance of Turmeric and *Tinospora cordifolia*.

OR

6. Describe the various methods of evaluation of crude drugs.

7. Describe in detail ecological succession

OR

8. Explain the components of the ecosystem.

Section B (Short Essay Type)

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

9. What is Vienna code?
10. Describe the floral characters of Amaranthaceae.
11. Outline the traditional methods of Ayurveda.
12. Explain the energy flow in an ecosystem
13. Explain Numerical taxonomy
14. Recall the medicinal aspects of Sarpagandha

Basavaraj.d
Head of the Department
St. Francis College,
Begumpet.

Subhame

A. Sarathna Rani
DEPARTMENT OF BOTANY
OSMANIA UNIVERSITY
HYDERABAD-500 007

SECTION A - INTERNAL CHOICE				4Q X 10 M = 40 M
Question Number	Question	Question	CO	BTL (Blooms Taxonomy Level)
1	Module 1	Outline the Bentham and Hooker system of classification and list its merits and demerits.	CO 1	Level I, Level II
2	Module 1	Describe in detail and discuss about ICBN.	CO 1	Level I
3	Module 2	Explain in detail the general characters of the family Asteraceae.	CO 2	Level II
4	Module 2	Explain Chemotaxonomy.	CO 2	Level II
5	Module 3	Describe the biological source, chemical constituents and medical significance of Turmeric and *Tinospora cordifolia*.	CO 3	Level I
6	Module 3	Describe the various methods of evaluation of crude drugs.	CO 3	Level I
7	Module 4	Describe in detail ecological succession	CO 4	Level I
8	Module 4	Explain the components of the ecosystem.	CO 4	Level II
SECTION B - ANSWER ANY 4 OUT OF 6 (To compulsorily have ONE question from each module)				4Q X 5 M = 20 M
9	Module 1	What is Vienna code?	CO 1	Level I
10	Module 2	Describe the floral characters of Amaranthaceae.	CO 2	Level I
11	Module 3	Outline the traditional methods of Ayurveda.	CO 3	Level II
12	Module 4	Explain the energy flow in an ecosystem	CO 4	Level II
13	Module 2	Explain Numerical taxonomy	CO 2	Level II
14	Module 3	Recall the medicinal aspects of Sarpagandha	CO 3	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	10	CO 1	2	10 each	1	5
2	17	CO 2	2	10	1	5
3	18	CO 3	2	10	1	5
4	15	CO 4	2	10	1	5

9. CO-PO Mapping

CO	PO	Cognitive Level	Classroom sessions (hrs)
1	1, 5	Analyzing	10
2	1, 2, 5	Remembering	17
3	1 - 8	Understanding	18
4	1, 2, 5, 8	Understanding	15

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TAXONOMY, MEDICINAL BOTANY & ECOLOGY

Practical Syllabus

1. Course Description

Programme:	**B. Sc**	**Max. Hours:**	**30**
Course Code:	**U24/ BOT/ DSC/301/P**	**Hours per week:**	**2**
Type of Course:	**DSC-3**	**Max. Marks:**	**50**
No. of Credits:	**1**		

2. Course Objectives

1. To explain the diversity of plant species and their classification according to taxonomic hierarchies.
2. To practice fieldwork and laboratory exercises to reinforce theoretical knowledge with practical skills.

3. Course Outcomes

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

CO 1: To identify unknown plant specimens using multiple forms of reliable evidence
CO 2: Develop proficiency in native plant identification by observing their characteristics
CO 3: To summarize the chemistry of plant components and their products so as to exploit their phytochemical nature.
CO 4: To distinguish the various ecological adaptations in plants and their sampling methods.

4. Course Content

1. Systematic study of locally available plants belonging to the families prescribed in theory syllabus (Minimum of one plant in each family).
2. Demonstration of herbarium technique
3. Detailed morphological and anatomical study of medicinally important part(s) of locally available plants (a minimum of ten plants) used in traditional medicine.
4. Field visits to identify and collect ethno medicinal plants used by local tribes/folklore.
5. Preparation and submission of 25 specimens for evaluation during the practical examination.
6. Study of morphological and anatomical characteristics of plant communities using locally available plant species: Hydrophytes (*Eichhornia, Hydrilla, Pistia, Nymphaea, Vallisneria*); Xerophytes (*Asparagus, Opuntia, Euphorbia tirucalli*).
7. To determine a minimal quadrat area for sampling in the given simulation sheet
8. To estimate dissolved oxygen content of given water (polluted and unpolluted) sample using Winkler's method.

Head of the Department
St. Francis College,
Begumpet.

CHAIRPERSON
B.O.S. IN BOTANY
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HYDERABAD-500 007

4. Model Question Paper – End Semester Exam Practical

TAXONOMY, MEDICINAL BOTANY & ECOLOGY

Course Code: U24/ BOT/ DSC/301/P

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

Q I. Assign the specimens 'A' and 'B' to their respective families giving reasons. Draw, describe and classify.
Scheme for valuation: (Description – 4; Diagram – 3; Floral diagram & floral formula – 2; Classification – 1) **2 x 10 – 20 Marks**

Q II. Identify, draw and describe the given two spotter's '**C**' and '**D**' **2 x 5 – 10 Marks**

Q III. Herbarium and Viva **3 + 2 – 5 Marks**

Q IV. Project. (Conduct field work for a period of not less than 5 days under the guidance of a teacher and submit field report) **10 Marks**

Q V. Record **5 Marks**

Prepared by	Checked &verified by	Approved by
Dr. S. Revathi **Teaching faculty**	**Dr. Basanti Chintapalli** **HoD**	**Dr. Uma Joseph** **Principal**

Head of the Department
St. Francis College,
Begumpet.

CHAIRPERSON
B.O.S. IN BOTANY
OSMANIA UNIVERSITY
HYDERABAD-500 007