SEMESTER - I

ANIMAL DIVERSITY- INVERTEBRATES

1. Course Description

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

Course Code: U24/ZOO/DSC/101 **Hours per week: 4**

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

No. of credits: 4

2. Course Objectives

- To explain the basic structural & functional aspects of Animal diversity
- Students will be able to classify organisms into phyla based on given descriptions.
- Student can acquire knowledge regarding the economic values and affinities

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 Invertebrates, and recognize, illustrate general characteristics, summarize invertebrates from Protozoa and Porifera.

CO2: To recognize, illustrate general characteristics, summarize invertebrates from phylum Cnidaria, Platyhelminthes and Nemathelminthes.

CO3: To recognize, illustrate general characteristics, summarize invertebrates from phylum Annelida and Arthropoda.

CO4: To recognize, illustrate general characteristics, summarize invertebrates from phylum Mollusca, Echinodermata and Hemichordata.

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4. **Course Content**

MODULE I: PROTOZOA & PORIFERA **15 Hrs**

1.1. Brief history of Invertebrates- Kingdom Animalia; Brief history of Invertebrates.

1.2. Protozoa - General characters; Classification up to classes with examples; Type study – Elphidium; Locomotion and Reproduction in Protozoa.

1.3. Porifera -General characters; Classification of Porifera up to classes with examples Type study – Sycon; Canal system in sponges and Spicules.

MODULE II: CNIDARIA, PLATYHELMINTHES & NEMATHELMINTHES **15 Hrs**

2.1. Cnidaria - General characters; Classification of Cnidaria up to classes with examples Type study – *Obelia;* Polymorphism in hydrozoa; Corals and coral reef formation.

2.2. Platyhelminthes - General characters; Classification of Platyhelminthes up to classes with examples; Type study- *Schistosoma.*

2.3. Nemathelminthes- General characters; Classification of Nemathelminthes up to classes with examples; Type study – *Dracunculus;* Parasitic Adaptations in Helminthes.

MODULE III: ANNELIDA & ARTHROPODA **15 Hrs**

3.1. Annelida: General characters; Classification of Annelida up to classes with examples; Type study - *Hirudinaria granulosa;* Evolutionary significance of Coelom and Coelomoducts; Metamerism

3.2 Arthropoda - General characters; Classification of Arthropoda up to classes with examples Type study – Prawn; Mouth parts of Insects; *Peripatus* - Structure and affinities

MODULE IV: MOLLUSCA, ECHINODERMATA & HEMICHORDATA **15 Hrs**

4.1. Mollusca- General characters; Classification of Mollusca up to classes with examples Type study – *Pila;* Pearl formation; Torsion and detorsion in gastropods

4.2. Echinodermata - General characters; Classification of Echinodermata up to classes with examples; Water vascular system in starfish; Echinoderm larvae and their significance

4.3. Hemichordata - General characters; Classification of Hemichordata up to classes with examples; *Balanoglossus* - Structure and affinities

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5. References

1. L.H. Hyman '*The Invertebrates' Vol I, II and V.* – M.C. Graw Hill Company Ltd.
2. Kotpal, R.L. 1988 - 1992 Protozoa, Porifera, Coelenterata, Helminthes, Arthropoda, Mollusca, Echinodermata. Rastogi Publications, Meerut.
3. E.L. Jordan and P.S. Verma '*Invertebrate Zoology'* S. Chand and Company.
4. R.D. Barnes '*Invertebrate Zoology'* by: W.B. Saunders CO., 1986.
5. Barrington. E.J.W., '*Invertebrate structure and Function'* by ELBS.
6. P.S. Dhami and J.K. Dhami. Invertebrate Zoology. S. Chand and Co. New Delhi.
7. Parker, T.J. and Haswell '*A text book of Zoology'* by, W.A., Mac Millan Co. London.
8. Barnes, R.D. (1982). *Invertebrate Zoology*, V Edition"

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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	It is important to develop an understanding of invertebrate biology and appreciate their biodiversity. They form a key element in the food chains and are the most successful and prolific animals on the planet.

b)Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	II, III & IV	Guest lecture and Seminar

7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	**Experiential Learning**	Field Trips, Science Experiments
2.	**Participative Learning**	Presentation,Seminar & Workshops

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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-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- INVERTEBRATES
MODEL QUESTION PAPER- THEORY

Course Code: U24/ZOO/DSC/101 **Max Marks: 60**
Credits: 4 **Time: 2 Hrs**

ILLUSTRATE WITH DIAGRAMS WHEREVER NECESSARY

SECTION – A

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

1. Write the general Characters of protozoa and write in detail the modes of reproduction

OR

2. What is the canal system? Explain Canal system in Sponges.

3. Write the general characters of Cnidaria and explain polymorphism with Obelia as an example.

OR

4. Write the Classification of Platyhelminthes up to classes with examples and describe the life cycle of Schistosoma haematobium.

5. Explain metamerism and write a note on Evolutionary significance of Coelom and Coelomoducts.

OR

6. Write a note on the taxonomic position of prawn and explain in detail its nervous system.

7. Write the general characters of Mollusca and explain the phenomenon of torsion and detorsion in gastropods.

OR

8. Discuss the affinities and taxonomic position of Balanoglossus

SECTION-B

II. Answer any Four of the following **4 x 5 = 20 M**

9. Locomotion in Protozoa
10. Spicules
11. Coral reef formation
12. Mouth part of insects
13. Metamerism
14. Water vascular system in Starfish

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ANIMAL DIVERSITY- INVERTEBRATES - MODEL QUESTION PAPER- THEORY

SECTION A - INTERNAL CHOICE			4 Q X 10 M = 40 M	
Q.No	**Question**	**Question**	**CO**	**BTL**
1	**Module 1**	Write the general Characters of protozoa and write in detail the modes of reproduction	CO 1	1
2	**Module 1**	What is the canal system? Explain Canal system in Sponges.	CO 1	2
3	**Module 2**	Write the general characters of Cnidaria and explain polymorphism with Obelia as an example.	CO 2	1
4	**Module 2**	Write the Classification of Platyhelminthes up to classes with examples and describe the life cycle of Schistosoma haematobium.	CO 2	1
5	**Module 3**	Explain metamerism and write a note on Evolutionary significance of Coelom and Coelomoducts.	CO 3	2
6	**Module 3**	Write a note on the taxonomic position of prawn and explain in detail its nervous system.	CO 3	3
7	**Module 4**	Write the general characters of Mollusca and explain the phenomenon of torsion and detorsion in gastropods.	CO 4	1
8	**Module 4**	Discuss the affinities and taxonomic position of Balanoglossus	CO 4	3

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SECTION B - ANSWER ANY 4 OUT OF 6 4 Q X5 M = 20 M				
9	**Module 1**	Locomotion in Protozoa	CO 1	1
10	**Module 2**	Coral reef formation	CO 2	2
11	**Module 3**	Mouth part of insects	CO 3	1
12	**Module 4**	Water vascular system in Starfish	CO 4	2
13	**Module 1**	Spicules	CO 1	1
14	**Module 3**	Metamerism	CO 3	2

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10. Practical Syllabus and model paper

ANIMAL DIVERSITY - INVERTEBRATES

PRACTICALS

Programme: B.Sc **Hours per week: 2 Hrs /Week**

Course Code: U24/ZOO/DSC/101/P **Max. Marks: 50**

Course Type: DSC I **No. of credits: 1**

Course Objective:

To understand the basic structural & functional aspects of Animal diversity - Invertebrates

Course Outcome:

To identify and remember the various invertebrate specimens under study.

To evaluate the techniques learnt during dissections.

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

- **Protozoa**: Amoeba, *Paramoecium, Entamoeba histolytca*
- **Porifera**: *Sycon, Spongilla, Euspongia, Sycon* - T.S & L.S, Spicules
- **Cnidaria**: *Obelia – Colony & Medusa, Physalia, Velella, Corallium, Gorgonia, Pennatula*
- **Platyhelminthes**: *Planaria, Fasciola hepatica, Fasciola* larval forms – Miracidium, Redia, Cercaria, *Echinococcus granulosus, Taenia solium, Schistosoma haematobium*
- **Nemathelminthes**: *Ascaris (Male & Female), Drancunculus, Ancylostoma*
- **Annelida**: *Nereis, Aphrodite, Chaetopteurs, Hirudinaria,* Trochophore larva
- **Arthropoda**: Cancer, Palaemon, Scorpion, *Scolopendra, Sacculina, Limulus, Peripatus,* , Mouth parts of male & female *Anopheles* and *Culex,* Mouthparts of Housefly and Butterfly.
- **Mollusca**: *Chiton, Pila, Unio, Pteredo, Sepia, Loligo, Octopus, Nautilus,* Glochidium larva
- **Echinodermata**: *Asterias, Ophiothrix, Echinus, Clypeaster, Cucumaria, Antedon,* Bipinnaria larva
- **Hemichordata**: *Balanoglossus,* Tornaria larva

Dissections:

Prawn: Appendages, Digestive system, Nervous system, Mounting of Statocyst

Insect Mouth Parts

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.

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MODEL QUESTION PAPER

PRACTICAL

Course Code: U24/ZOO/DSC/101/P **Max Time: 2 hrs**

Credits: 1 **Max. Marks: 50**

I. Dissection Diagram: **10 M**

Prawn: Appendages, Nervous system, Mounting of Statocyst Insect Mouth Parts

II. Identify, classify, draw, label & write points of identification for the following spots (A-J). **10 x 2 = 20 M**

A.Protozoa: Amoeba, Paramoecium, Entamoeba histolytica
B. Porifera: Sycon, Spongilla, Euspongia, Sycon- T.S & L.S, Spicules
C. Cnidaria: Obelia–Colony & Medusa, Physalia, Velella, Corallium, Gorgonia, Pennatula
D. Platyhelminthes: Planaria, Fasciola hepatica, Echinococcusgranulosus, Taenia solium, Schistosoma haematobium
E. Nemathelminthes: Ascaris(Male & Female), Dracunculus, Ancylostoma
F. Annelida: Nereis, Aphrodite, Chaetopteurs, Hirudinaria, Trochophore larva
G. Arthropoda: Cancer, Palaemon, Scorpion, Scolopendra, Sacculina, Limulus, Peripatus, Mouth parts of male &female Anopheles and Culex, Mouth parts of Housefly and Butterfly.
H. Mollusca: Chiton, Pila, Unio, Pteredo, Sepia, Loligo, Octopus, Nautilus, Glochidium larva
I. Echinodermata: Asterias, Ophiothrix, Echinus, Clypeaster, Cucumaria, Antedon, Bipinnarialarva
J. Hemichordata: Balanoglossus, Tornaria Larva

III. ANIMAL ALBUM **10 M**

IV. RECORD **10 M**

Prepared by	Checked & Verified by	Approved by
Dr. Vidya. Jayaram Name and Signature of the teaching faculty	Name and Signature of HoD DR. JYOTHI RANI	Name and Signature of Principal

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SEMESTER – I

BASIC COMPUTER SKILLS

1. Course Description:

Programme: BA/B.Sc./B.Com./BMS **Max. Hours: 30**

Course Code: U24/BCS/AECC/101 **Hours per week: 2**

Type of course: AECC **Max. Marks: 50**

No. of credits: 2

2. Course Objectives:

To impart a basic level understanding of working of a computer and its usage.

3. Course Outcome:

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

CO1: ***Interpret*** basics of computers and ***Use*** word processing software (Cognitive levels – 3)

CO2: ***Define*** Internet Technologies and ***Use*** Spreadsheets and Presentation Software (Cognitive level – 3)

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4. Course Content:

MODULE I: BASICS OF COMPUTERS AND WORD PROCESSING (15 Hrs)

Understanding Of Computer: Introduction to computers - functions, features, classification; Computer Architecture - components; Computer Hardware - input devices, output devices; Computer Memory -primary memory, secondary memory, cloud; Computer Software - system software, application software, special purpose software, system utilities, open-source software, and proprietary software; Operating Systems - functions, types, real time operating systems,

Windows Ui And Word Processing: Windows desktop – icons, task bar, start menu, understanding of local system drives, folders and files – creating, viewing, renaming, deleting; MS-Word - opening , closing, saving of documents, title bar, ribbon and tabs, ruler; text creation and manipulation – insert, delete, select, cut, copy and paste, find and replace, correct errors - spell; formatting text – font size, size, colour, bold, underline, italic, changing text case, text alignment; creating first line indent of paragraphs; formatting page – inserting header and footer, page breaks; modifying page layout - changing page orientation , page size, page margins; tables – inserting, adding and deleting rows and columns, converting text to table, working with lists, using symbols as bullets, printing documents

MODULE II: INTRODUCTION TO INTERNET TECHNOLOGY, SPREADSHEETS AND PRESENTATION SOFTWARE (15Hrs)

Overview of Internet and Future Technology: Internet – advantages and disadvantages of internet; Terms related to internet – WWW, web page, website, web browser, web address and URL, blog, search engine; Services of Internet – chatting, e-mail, video- conferencing, e-learning, e-banking, e-shopping, e-reservation; Social networking sites – LinkedIn, Facebook, Instagram; Computer Security – sources of cyber-attack, malware, threats to computer security, solutions to computer security threats; Future Technology – Internet of Things(IoT), Big Data Analytics, Virtual Reality, Artificial Intelligence,

Spreadsheet and Presentation Software: Spreadsheets - Workbook, worksheet, MS Excel vs Google sheets; basics of spreadsheet – enter, select, delete, move, copy and paste data, fill numbers, text, date; adding borders to cells, functions – count, sum, average; formulas – simple, relative reference, absolute reference, printing worksheet; Presentation – introduction to slide, placeholder, notes, adding slides, changing layouts of slides, applying styles and background, adding text box and pictures, adding animations, setting slide transitions, saving single slide as image, saving presentation in different formats (ppt, pdf, video)

5. References:

1. Microsoft Office Step by Step (Office 2021 and Microsoft 365), Joan Lambert, 1st edition, 2022
2. Computer Basics with Office Automation, Archana Kumar, Wiley publications,2019
3. Introduction to Computers, Peter Norton, McGraw-Hill ,2012.
4. Fundamentals of Computers, Reema Thareja,2nd Edition 2019.

6. Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
GLOBAL DEVELOPMENT	Basic computer skills such as word processing, spreadsheets, presentations, and the internet, are essential for most jobs and are considered valuable skills in the workforce. Good computer skill aligns with an individual's career goals and enhances productivity and effectiveness in the workplace.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD, EMP	Module 1	Assignment
SD, EMP	Module 2	Skill practical test

7. Course Assessment Plan

a) Weightage of Marks in Formative and Summative Assessments

Formative Assessment - FA (40%)	Summative Assessment - SA (60%)
CIA-20 marks Mini project/Assignment/ Problem solving/Case studies	End Semester Exam-30 Marks

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b) Model Question Paper - End Semester Exam

BASIC COMPUTER SKILLS

Course Code: U24/BCS/AEEC/101 **Max Time: 1 Hr**
Credits: 2 **Max. Marks: 30**

Answer any 5 of the following: **5 X 6 = 30 M**

1. Explain Computer Architecture.
2. Differentiate between Primary and Secondary Memory.
3. Explain functions of an Operating System.
4. Define types of Software.
5. Write a short note on the Internet.
6. List and explain the services of the Internet.
7. Explain with example the concept of IoT.
8. Explain various threats to computer systems.

Prepared by	Checked & verified by	Approved by
Ms. Prabhmeet **Teaching Faculty**	**Ms. D. Sowjenya** **HOD**	**Dr. Uma Joseph** **Principal**

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SEMESTER - I

CHEMISTRY PAPER - I

1. Course Description

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

Course Code: U24/CHE/DSC/101 Max. Marks: 100

Course Type: DSC - 1 Hours per week: 4Hrs

No. of credits: 4

2. Course Objectives ·

- To help the students acquire knowledge on the basic principles of Quantum mechanics and chemical bonding
- To understand the nature and properties of different states of matter. • · To learn the structures of basic organic molecules, the types of reactions they undergo and methods of preparation and reactivity of hydrocarbons with mechanisms • · To foster acquisition of knowledge on the concepts of colligative properties and Quantitative analysis

3. Course Outcomes

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

CO1: Understand and explain the structure of an atom using quantum mechanics and Chemical bonding

CO2: Understand the properties of gases, liquid crystals and crystalline solids.

CO3: Acquire a fundamental understanding of the relationships between molecular structure and reaction mechanisms. Interpret and familiarize with the various types of aliphatic reactions.

CO4: Apply knowledge in quantitative analysis and study about Colligative properties

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4. Course Content

Module I: INORGANIC CHEMISTRY 15 Hrs

Atomic Structure and Elementary Quantum Mechanics **8 Hrs**

Limitations of Classical Mechanics, Black body radiation, Rayleigh Jeans Law, Planck's radiation law, photoelectric effect, Compton effects, De Broglie's hypothesis, Heisenberg's uncertainty principle, sinusoidal wave equation, Hamiltonian operator, Schrodinger equation in Cartesian and spherical polar coordinates (no derivation) Physical significance of terms involved, equation applied to H-atom. Atomic Orbitals, Radial and angular wave functions, Shape of atomic orbitals (Quantitative treatment) based on angular wave functions). Probability distribution curves - Quantum numbers and their importance.

Chemical bonding **7Hrs**

Ionic solids- lattice and solvation energy, solubility of ionic solids, Fajan's rule, Polarity and polarizability of ions, covalent nature of ionic bonds. Covalent bond- VB theory and common hybridization and shapes of molecules.

Molecular orbital theory- shapes and sign convention of atomic orbital, modes of overlapping, concepts of sigma and pi bonds, criteria forming molecular orbital from atomic orbital. LCAO concept. Types of molecular orbitals, bonding and anti-bonding and non-bonding. MOED of homonuclear - H_2, N_2, O_2, O_2^-,O_2^{2-}, F_2, (unhybridized diagram only) and heteronuclear diatomic molecules CO, CN^-, NO, $NO^+$and HF. Bond order, stability and magnetic properties.

Module II: PHYSICAL CHEMISTRY 15 Hrs

States of Matter

Gaseous State **7 Hrs**

Deviation of real gases from ideal behavior, Vander Waal's equation of state. Critical phenomena: PV-isotherms of real gases, continuity of state, Andrew's isotherms of carbon dioxide. The Vander Waals equation and the critical state, Derivation of relationship between critical constant and Vander Waals constants. Experimental determination of critical constants. The law of corresponding states, reduced equation of state. Joule -Thomson effect and inversion temperature of a gas. Liquefaction of gases: (i) Linde's method based on Joule Thomson effect. (ii) Claude's method based on adiabatic expansion of a gas.

Liquid State **3 Hrs**

Inter molecular forces, structure of liquids (qualitative description). Structural differences between solids, liquids and gases. Liquid crystals, the mesomorphic state: Classification of liquid crystals into Smectic and Nematic, differences between liquid crystal and solid/liquid. Application of liquid crystals as LCD devices.

Solid State **5 Hrs**

Laws of crystallography (i) Law of Constancy of interfacial angles (ii) law of symmetry, symmetry elements in crystals. (iii) Law of rationality of indices. Definition of space lattice, unit cell. Bravais lattices and seven crystals systems. X-ray diffraction of crystals: Deviation of

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Bragg's equation, determination of structure of NaCl (Bragg's method and powder method).

Defects in crystals: Stoichiometric and non-Stoichiometric defects. Band theory of semiconductors: Extrinsic and Intrinsic Semiconductors, n-type and p-type and their applications in photo voltaic cells.

MODULE III ORGANIC CHEMISTRY 15 Hrs

Structural Theory of Organic Molecules 7 Hrs

Cleavage of bonds (homolysis and heterolysis), Electrophiles, Nucleophiles (including neutral molecules like H_2O, BF_3, NH_3 and $AlCl_3$). Reactive intermediates: carbocations, carbanions and free radicals.

Electronic Displacements

Inductive effect. Application of inductive effect to a) Basicity of amines b) Acidity of Carboxylic acids and c) Stability of carbocations. Resonance or Mesomeric effect. Application to a) Acidity of phenol and (b) acidity of carboxylic acids .Hyper-conjugation and its application to stability of carbocations, Free radicals and alkenes.

Types of organic reactions (mechanism not required)

Addition – Electrophilic, nucleophilic and free radical. Substitution – Electrophilic, Nucleophilic and Free radical. Elimination and Rearrangement Reactions – examples.

Aliphatic Hydrocarbons 8Hrs

Aliphatic Hydrocarbons

Alkanes – Methods of preparation: Corey-House reaction, Wurtz reaction, from Grignard reagent, Kolbe synthesis. Chemical reactivity - inert nature, free radical substitution, Halogenation example- reactivity, selectivity and orientation.

Alkenes – Preparation of alkenes (with mechanism) (a) by dehydration of alcohols (b) dehydro-halogenation of alkyl halides (c) by dehalogenation of 1,2 dihalides, Zaitsev's rule. Properties: Addition of Hydrogen – heat of hydrogenation and stability of alkenes. trans addition of halogen and its mechanism. Addition of HX, Markonikov's rule, addition of H_2O, HOX, H_2SO_4 with mechanism and addition of HBr in the presence of peroxide (anti – Markonikov's addition). Oxidation (cis – additions) – hydroxylation by $KMnO_4$, OsO_4, trans addition- peracids (via epoxidation), hydroboration, ozonolysis – location of double bond. Dienes – Types of dienes, reactions of conjugated dienes – 1,2 and 1,4 addition of HBr to 1,3 -butadiene and Diels – Alder reaction.

Alkynes – Preparation by dehydrohalogenation of vicinal dihalides, dehalogenation of tetrahalides. Physical Properties: Acidity of terminal alkynes (formation of metal acetylides) preparation of higher alkynes, Chemical reactivity – electrophilic addition of X_2, HX, H_2O (tautomerism), Oxidation (formation of enediol, 1,2 diones and carboxylic acids) and reduction (Metal-ammonia reduction, catalytic hydrogenation).

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MODULE IV: GENERAL CHEMISTRY — 15 Hrs

Theory of Quantitative Analysis — 7Hrs

Principles of volumetric analysis: Introduction, standard solution, indicators, endpoint, titration error. Types of titrations: i) Neutralization titrations- principle, titration curves and selection of indicators- strong acid-strong base, strong-acid- weak base, weak acid-strong base, weak acid-weak base. ii) Redox titrations-principles, detection of endpoint, redox indicators. iii) Precipitation titrations-principle, detection of endpoint, indicators. iv) Complexation titrations-principle, metal ion indicators.

Principles of gravimetric analysis – Introduction, nucleation, precipitation, growth of precipitate, filtration and washing, drying and incineration of precipitate. Co-precipitation and post-precipitation. Explanation with suitable examples.

Evaluation of analytical data — 3 Hrs

Significant figures, accuracy and precision. Errors-classification of errors- determinate and indeterminate errors, absolute and relative errors, propagation of errors in mathematical operations – addition, subtraction, division and multiplication (with respect to determinate errors).

Colligative Properties — 5 Hrs

Colligative Properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis - laws of osmotic pressure, its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point and depression in freezing point.

5. References

1. Puri, B.R., Sharma L.R., and Pathania, M.S. (2003). *Elements of Physical Chemistry.* Jalandhar, Delhi: Vishal Publishing Co.
2. 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.
3. Bahl, A. and Bahl, B.S. (2011). *A Textbook of Organic Chemistry.* Ram Nagar, New Delhi: S. Chand and Company.
4. Jain, M.K., and Sharma, S.C. (2011). *Modern Organic Chemistry.* Jalandhar, Delhi: Vishal Publishing Co.
5. Sharma, Y. R. (2012). *A TextBook of Complete Organic Chemistry*. Bangalore: Kalyani Publishers.
6. Principles of Inorganic Chemistry by Puri, Sharma and Kalia. Vishal Publications 1996.
7. Concise Inorganic Chemistry by J.D. Lee 3rd edn.

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CHEMISTRY PAPER-I

MODEL QUESTION PAPER

THEORY

Course Code: U24/CHE/DSC/101 **Time: 2hrs**

Credits: 4 **Max. Marks: 60**

SECTION –A

I. Answer the following **4QX10M=40 Marks**

1. Write the Schrodinger wave equation and explain the significance of ψ and ψ^2 and draw shapes of p and d atomic orbitals 10M **L1**

OR

2. Write postulates of MOT. Explain MOED of O2. 8M **L1**

3. Explain Critical phenomenon and derive relationship between Van der Waals constants and critical constant. 10M **L2**

OR

4. Explain (a) Frenkel defect (b) Schottky defect (c) Metal excess defect (d) Metal deficiency defect 10M **L2**

5. a) What is the Mesomeric effect? How does it explain the acidity of phenols? 5M **L1**

b) Give the order of basicity of the following amines by applying the concept of Inductive effect CH_3NH_2, $(CH_3)_2NH$, $(CH_3)_3N$ 5M **L1**

OR

6. a) Explain Acidity of terminal Alkynes 5M **L2**

b) Write any two methods of preparation of Alkanes. 5M **L1**

7. Explain the principle involved in redox titration? Write a short note on detection of endpoints. 10M **L2**

OR

8. What is molal depression constant? Derive the relation between depression of freezing point and molecular weight of the solute. 10M **L1**

SECTION –B

II. Answer any Four 4Qx5M=20 Marks

9. State and explain Heisenberg's uncertainty principle. Calculate the uncertainty in the position of a particle when the uncertainty in the momentum is 0.01 gm.cm/ sec. (h= 6.625x 10^{-27} erg.sec). 5M(CO1) **L3**

10. Differentiate between Smectic, Nematic liquid crystals and give their application. 5M (CO2)**L3**

11. What are dienes? Explain 1,2- and 1,4- addition of HBr on 1,3-Butadiene. 5M (CO 3)

12. Define the term accuracy and precision with examples. 5M (CO 4) **L1**

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13. Explain Andrew Isotherm of CO_2 at different temperatures 5M (CO 2) **L2**
14.. Explain Markonikoff's rule with examples. 5M (CO 3) **L2**

St. FRANCIS COLLEGE FOR WOMEN, BEGUMPET, HYDERABAD-500016
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FACULTY OF SCIENCE- DEPARTMENT OF CHEMISTRY
PRACTICAL SYLLABUS CBCS-2024
SEMESTER -I
QUANTITATIVE ANALYSIS 1
(Volumetric and Gravimetric Analysis)

Program: B.Sc.
Course Code: U24/CHE/DSC/101/ P
Course: DSC-1
No. of Credits: 1

Max. Hours: 30 Hrs
Max. Marks: 50
Hours per week: 3 Hrs

Course Objective

- To learn the principles involved in volumetry and gravimetry

Course Outcome

CO 1: Acquire knowledge in standardizing and estimating unknown samples quantitatively.

CO 2: Analyse possible market samples based on the principles involved in volumetry and compare with standards.

Volumetric Analysis

1. Estimation of sodium carbonate.
2. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.
3. Estimation of oxalic acid by titrating it with $KMnO_4$.
4. Estimation of water of crystallization in Mohr's salt by titrating with $KMnO_4$.
5. Estimation of carbonate in washing soda.
6. Estimation of Acetic Acid in Vinegar.
7. Estimation of alkali content in antacids using HCl.

Gravimetric Analysis:

8. Estimation of chromate as lead chromate.

References:

1. Svehla, G. Vogel's Qualitative Inorganic Analysis, Pearson Education, 2012.
2. Mendham, J. Vogel's Quantitative Chemical Analysis, 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	Knowledge of the basic principles of Chemistry to help in day-to-day life.
Regional	Learn about the concepts of structure of atoms and their bonding.
National	Understand the basics of structure of organic molecules, preparation and reactivity of aliphatic and aromatic hydrocarbons.
Global	Application of quantitative Analysis, evaluation of analytical data and Colligative Properties.

b. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Module I	Deriving equations, solving theoretical problems and interpreting results.
ED	Module II	JAM: Students pick up a topic and speak about it for a minute.
SD	Module III	Assignment/Mechanism: Students write an assignment/Illustrate the steps involved in the mechanism of reactions.
EMP	Module IV	Quantitative analysis is used extensively in Analytical research laboratories

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7. **Pedagogy**

S. No.	Student Centric Methods Adopted	Type / Description of Activity
1	Participative Learning	Assignment
2	Participative Learning	Collage/ Quiz/ JAM

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 Collage/Quiz/JAM**	
CO3	**CIA-1 -** Written Exam	
CO4	**CIA-2 Assignment**	

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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. I YEAR SEMESTER -I

Course Code: U24/CHE/DSC/101 **Time: 2 Hrs**
Credits: 4 **Max. Marks: 60**

SECTION –A (Essay Questions)

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

1. Write the Schrodinger wave equation and explain the significance of ψ and ψ^2 and draw shapes of p and d atomic orbitals. (CO1) **LI** 10M

OR

2. Write postulates of MOT. Explain MOED of O2. (CO1) **L1** 8M
3. Explain Critical phenomenon and derive relationship between Van der Waals constants and critical constant. (CO2) **L2** 10M

OR

4. Explain (a) Frenkel defect (b) Schottky defect (c) Metal excess defect (d) Metal deficiency defect. (CO2) **L2** 10M
5. a) What is the Mesomeric effect? How does it explain the acidity of phenols? (CO3) **L1** 5M
   b) Give the order of basicity of the following amines by applying the concept of Inductive effect CH_3NH_2, $(CH_3)_2NH$, $(CH_3)_3N$ (CO3) **L1** 5M

OR

6. Write the mechanism for Friedel Crafts alkylation and acylation of benzene. (CO3) **L1** 10M

7. Explain the principle involved in redox titration? Write a short note on detection of endpoints. (CO4) **L2** 10M

OR

8. What is molal depression constant? Derive the relation between depression of freezing point and molecular weight of the solute. (CO4) **L1** 10M

SECTION –B (Short Answer Questions)

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

9. State and explain Heisenberg's uncertainty principle. Calculate the uncertainty in the position of a particle when the uncertainty in the momentum is 0.01 gm.cm/ sec. ($h = 6.625 \times 10^{-27}$ erg. sec). (CO1) **L3**
10. Differentiate between Smectic, Nematic liquid crystals and give their application. (CO2) **L3**
11. What are dienes? Explain 1,2- and 1,4- addition of HBr on 1,3-Butadiene. (CO 3) **L1**
12. Define the term accuracy and precision with examples. (CO 4) **L1**
13. Explain Andrew Isotherm of CO_2 at different temperatures. (CO 2) **L2**
14. Explain Markonikoff's rule with examples. (CO 3) **L2**

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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	15	CO1	2	10	1	5
2	15	CO2	2	10	2	10
3	15	CO3	2	10	2	10
4	15	CO4	2	10	1	5

9. CO-PO Mapping

CO	PO	Cognitive Level	Classroom sessions (Hrs)
1	1	Understand	15
2	2	Analyse	15
3	1	Remember	15
4	2	Apply	15

Prepared by	Checked & verified by	Approved by
Name and Signature of the teaching faculty Ms. Karuna. K.S Dr. E.V.L. Madhuri	Name and Signature of the HoD Dr. D. Sumalatha	Name and Signature of Principal Dr. Uma Joseph

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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 -I

Time: 2 Hrs **Course Code: U24/CHE/DSC/101**
Max. Marks: 60 **Credits: 4**

SECTION A - INTERNAL CHOICE			**4 X 10 M = 40M**	
Question Number	**Question**		**CO**	**BTL**
1	**Module 1**	Write the Schrodinger wave equation and explain the significance of ψ and ψ^2 and draw shapes of p and d atomic orbitals. 10M **OR**	**CO1**	**Level 1**
2	**Module 1**	Write postulates of MOT. Explain MOED of O2. 8M	**CO1**	**Level I**
3	**Module 2**	Explain Critical phenomenon and derive relationship between Van der Waals constants and critical constant. 10M **OR**	**CO2**	**Level 2**
4	**Module 2**	Explain (a) Frenkel defect (b) Schottky defect (c) Metal excess defect (d) Metal deficiency defect. 10M	**CO2**	**Level 2**
5	**Module 3**	a) What is the Mesomeric effect? How does it explain the acidity of phenols? 5M b) Give the order of basicity of the following amines by applying the concept of Inductive effect CH_3NH_2, $(CH_3)_2NH$, $(CH_3)_3N$ 5M **OR**	**CO3**	**Level 1**
6	**Module 3**	Write the mechanism for Friedel Crafts alkylation and acylation of benzene. 10M	**CO3**	**Level 1**
7	**Module 4**	Explain the principle involved in redox titration? Write a short note on detection of endpoints. 10M **OR**	**CO4**	**Level 2**

8	Module 4	What is molal depression constant? Derive the relation between depression of freezing point and molecular weight of the solute. 10M	CO4	Level 2
SECTION B – (Short answer questions) **ANSWER ANY 4 OUT OF 6**				**4 X 5M = 20 M**
9	Module 1	State and explain Heisenberg's uncertainty principle. Calculate the uncertainty in the position of a particle when the uncertainty in the momentum is 0.01 gm.cm/ sec. (h= 6.625x 10^{-27} erg. sec).	CO1	Level 3
10	Module 2	Differentiate between Smectic, Nematic liquid crystals and give their application.	CO2	Level 3
11	Module 3	What are dienes? Explain 1,2- and 1,4-addition of HBr on 1,3-Butadiene.	CO3	Level 1
12	Module 4	Define the term accuracy and precision with examples. (CO 4) **L1**	CO4	Level 1
13	Module 2	Explain Andrew Isotherm of CO_2 at different temperatures. (CO 2) **L2**	CO2	Level 2
14	Module 3	Explain Markonikoff's rule with examples.	CO3	Level 2

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SEMESTER - I

THALLOPHYTA AND MICROBIOLOGY

1. Course Description

Programme:	**B. Sc**	**Max. Hours:**	**60**
Course Code:	**U24/ BOT/ DSC/101**	**Hours per week:**	**4**
Type of Course:	**DSC-1**	**Max. Marks:**	**60**
No. of Credits:	**4**		

2. Course Objectives

1. Describe the morphology, structure and importance of the lower plants.
2. Differentiate between various groups of Bacteria, Algae, Fungi and Lichens

3. Course Outcomes

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

CO1: Interpret the thallus organization and life cycles of various algal groups including cyanobacteria.

CO2: To explain the life cycles, diversity of thallus organization, and ecological significance for specific fungal species as well as lichens.

CO3: To recall the structure, nutrition, reproduction of microbes (bacteria & virus) and summarise their use with reference to beverages & antibiotics.

CO4: To examine the role that bacterial and fungal pathogens play in phytopathology and list the economic significance of algae, fungi, and mycorrhiza.

4. Course content

Module I: Algae **18 Hours**

1.1 Ecology and distribution; Range of thallus organization and reproduction. Classification of algae.

1.2 Morphology and life-cycles of the following: *Volvox* and *Oedogonium; Vaucheria; Ectocarpus; Polysiphonia.*

1.3 Cyanobacteria – Cell structure and thallus organization; Structure and Life History of *Oscillatoria* and *Nostoc*. Heterocyst - structure and function. Economic importance of Algae

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Module II: Fungi & Lichens **14 Hours**

2.1 General characteristics: Range of thallus organization and cell wall composition. Nutrition, reproduction and Classification.
2.2 Morphology and life-cycles of the following: *Albugo*; *Penicillium; Puccinia*; *Cercospora*. Economic importance of fungi.
2.3 Lichens – Types; Reproduction; Economic and ecological significance.

Module III: Microbiology **18 Hours**

3.1 Viruses - General characteristics and Transmission of Plant virus, structure of DNA virus - T-phage; Lytic and lysogenic cycle; RNA virus - TMV.
3.2 Bacteria – General characteristics and cell structure; Reproduction – Vegetative, asexual and recombination (conjugation, transformation and transduction). Microbial technique – method of culture media preparation and sterilization.
3.3 Brief account of Archaebacteria, Actinomycetes & Mycoplasma. Industrial Microbiology – Beverages – wine and Antibiotics – narrow spectrum (Penicillin)

Module IV: Plant Pathology **10 Hours**

4.1 Disease concept and Plant Disease Management
4.2 Classification of diseases – general symptoms. Morphological and biochemical defense mechanisms in plants.
4.3 A detailed study of the following plant diseases: Mosaic disease of tobacco, Citrus canker, Late blight of Potato, Red rot of sugarcane, Tikka disease of groundnut. Flor's hypothesis/ gene for gene hypothesis, Koch postulates to identify a pathogen or microbe, Symptomology, control measures. Classification of Fungi, Bacteria and Viruses.

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5. Reference Books

1. Alexopolous, J. and W. M. Charles. 1988. *Introduction to Mycology*. Wiley Eastern, New Delhi.
2. Mckane, L. and K. Judy. 1996. *Microbiology – Essentials and Applications*. Tata McGraw Hill, New York.
3. Singh, V., Pande, P.C and Jain, K.2008. *Diversity of Microbes and Cryptogams(4thEd.)*, Rastogi Publications, Meerut.
4. 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.
5. Pandey, B. P. 2007. *Botany for Degree Students: Diversity of Microbes, Cryptogams, Cell Biology and Genetics.* S. Chand & Company Ltd, New Delhi.
6. Sharma P.D.,*Plant Pathology*.2001.Rastogi Publications, Meerut.
7. Sambamurthy, A. V. S. S. 2006. *A Textbook of Algae*. I. K. International Pvt. Ltd., New Delhi.
8. Sharma, O. P. 1992. *Textbook of Thallophyta.* McGraw Hill Publishing Co., New Delhi.
9. Vashishta, B. R., A. K. Sinha and V. P. Singh. 2008. *Botany for Degree Students: Algae*.S. Chand& Company Ltd, New Delhi.
10. Vashishta, B. R. 1990. *Botany for Degree Students: Fungi*.S. Chand & Company Ltd, New Delhi.
11. Dube, H.C. 1988. *A Textbook of Fungi, Bacteria and Viruses*, Vikas publishing house Pvt. Ltd.
12. Govind Prakash. 1974. *Textbook of Fungi*, Jaiprakashnath & Co.,Meerut.
13. Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition.

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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	Thyllophytes are an important source of food, fodder, fertilizer, and are utilized in the production of numerous commercial items. They have a wide spectrum of economic value.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	**Syllabus Content**	**Description of Activity**
SD	Module I: Algae Module II: Fungi	Identification of few algal and fungal taxa based on vegetative and reproductive structures; by observing slides and specimens.
	Module III: Microbes	Differentiate Gram +ve and Gram -ve bacteria by Gram staining technique.
	Module IV: Plant pathology	Identification of common bacterial, viral, fungal and mycoplasma diseases in plants and steps for disease management.

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7. 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

THALLOPHYTA AND MICROBIOLOGY

Course Code: U24/ BOT/ DSC/101 **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. Explain the process of sexual reproduction in *Ectocarpus*.

   OR

2. Describe the ultrastructure of a Cyanophycean cell.

3. Explain the mode of sexual reproduction in *Albugo*.

   OR

4. With the help of a neat diagram describe the vertical section of Apothecium in Lichens.

5. Explain the structure of Bacteriophage.

   OR

6. What are Mycoplasmas? Discuss their structure and also comment on their economic importance.

7. Illustrate the methods of plant disease management

   OR

8. Explain the morphological and biochemical defense mechanisms in plants

SECTION –B (Short Essay Type)

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

9. What is Nannandrium?
10. Explain the teliospores of *Puccinia*
11. List the various means of transmission of Plant viruses
12. Explain the Tikka disease of groundnut
13. Outline the characters of Actinomycetes
14. Describe the Cystocarp of P*olysiphonia*

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

Question Number	Question	Question	CO	BTL (Blooms Taxonomy Level)
1	Module 1	Explain the process of sexual reproduction in *Ectocarpus*.	CO 1	Level II
2	Module 1	Describe the ultrastructure of a Cyanophycean cell.	CO 1	Level I
3	Module 2	Explain the mode of sexual reproduction in *Albugo*	CO 2	Level II
4	Module 2	Describe the vertical section of Apothecium in Lichens.	CO 2	Level I
5	Module 3	Explain the structure of Bacteriophage.	CO 3	Level V
6	Module 3	What are Mycoplasmas? Outline their structure and also comment on their economic importance.	CO 3	Level I & II
7	Module 4	Illustrate the methods of plant disease management	CO 4	Level II
8	Module 4	Explain the morphological and biochemical defense mechanisms in plants	CO 4	Level V

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

(To compulsorily have ONE question from each module)

9	Module 1	What is Nannandrium?	CO 1	Level I
10	Module 2	Explain the teliospores of *Puccinia*	CO 2	Level II
11	Module 3	List the various means of transmission of Plant viruses	CO 3	Level IV
12	Module 4	Explain the Tikka disease of groundnut	CO 4	Level II
13	Module 3	Outline the characters of Actinomycetes	CO 3	Level II
14	Module 1	Describe the Cystocarp of P*olysiphonia*.	CO 1	Level II

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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	18	CO 1	2	10	1	5
2	14	CO 2	2	10	1	5
3	18	CO 3	2	10	1	5
4	10	CO 4	2	10	1	5

9. CO-PO Mapping

CO	PO	Cognitive Level	Classroom sessions (hrs)
1	1, 5	Understanding	18
2	1, 2, 5	Understanding	14
3	1, 3, 5, 7	Remembering	18
4	1, 5, 8	Analysing	10

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THALLOPHYTA AND MICROBIOLOGY

Practical Syllabus

1. Course Description

Programme:	**B. Sc**	**Max. Hours:**	**30**
Course Code:	**U24/ BOT/ DSC/101/P**	**Hours per week:**	**2**
Type of Course:	**DSC-1**	**Max. Marks:**	**50**
No. of Credits:	**1**		

2. Course Objectives

1. To study the thallus organization in lower plants
2. To differentiate between gram positive and negative bacteria
3. To gain knowledge on common plant diseases and their control measures

4. Course Outcomes

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

CO1: Describe the world of algae, microbes, fungi and lichens through slides and specimens
CO2: Identify common plant diseases and device control measures
CO 3: Analyze the vegetative and reproductive structures of algae and fungi
CO4: Interpret the economic and pathological importance of bacteria and fungi

5. Course Content

1. Study of viruses and bacteria using electron micrographs/photographs.
2. Gram staining of Bacteria.
3. Study of symptoms of plant diseases caused by viruses and bacteria: **Viruses**: Tobacco mosaic virus, yellow vein clearing of Bhendi, Leaf curls of papaya. **Bacteria**: Citrus canker, Leaf blight of Rice, Angular leaf spot of cotton. **Fungi and Mycoplasma**: Tikka disease of Groundnut, Late blight of Potato, Ergot of Bajra, Whip smut of Sugarcane, Brown spot of Rice, Rice (Paddy) blast, Head smut of Sorghum, Little leaf disease of Brinjal.
4. Vegetative and reproductive structures of the following taxa:
   Algae: *Oscillatoria*, *Nostoc, Volvox*, *Oedogonium*, *Vaucher*ia, *Ectocarpus* and *Polysiphonia.*
   Fungi: *Albugo*, *Penicillium*, *Puccinia* and *Cercospora*.
5. Section cutting of diseased material infected by Fungi and identification of pathogens.
6. ***Lichens***: Different types of thalli and their external morphology.
7. Examination of important microbial, fungal and algal products: Biofertilizers, protein capsules, antibiotics, mushrooms, SCP, Agar-agar etc.
8. Field visits to places of algal / microbial / fungal interest (e.g., Mushroom cultivation, waterbodies).

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6. Model Question Paper – End Semester Exam Practical

THALLOPHYTA AND MICROBIOLOGY

Course Code: U24/ BOT/ DSC/101/P

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

Q I. Identify the algae '**A**' and '**B**' from the given mixture. Draw well labeled diagrams, Classify and identify important characters.
Scheme for valuation: (diagram – 2; classification – 1; characters – 2) **2 x 5 - 10 marks**

Q II. Prepare a temporary mount of the given fungal material '**C**'. Identify the pathogen and describe it with the help of a diagram
Scheme for valuation: (diagram -2, characters -2, classification–1) **5 Marks**

Q III. Describe the procedure of bacterial staining and identify the given bacterium '**D**'.
Scheme for valuation: description–4; identification–1) **5 marks**

Q IV. Identify, classify giving reasons with suitable diagrams of the given specimens and slides **E, F, G, H, I** **5 x 3 – 15 marks**

Q V. Seminar topic or Project **10 marks**

QVI. Record **5marks**

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

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