SEMESTER -V

BIOMATERIALS FROM ANIMAL SOURCES

1. **Course Description**

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

Course Code: U24/ZOO/SEC/501 **Hours per week: 2**

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

No. of credits: 2

2. Course Objectives

- To define biocompatibility of various materials and classify them according to their suitability for the specific biomedical application
- To Identify the specific biomaterial to be used for a specific tissue or organ replacement
- To distinguish the advantages, limitations of specific biomaterials for specific biomedical application

3. Course Outcomes

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

CO 1 Apply knowledge from basic material courses and give examples of application areas for different types of biomaterials.

CO 2 Explain basic physical, chemical and mechanical processes that may occur on biomaterials in use, to select proper type of biomaterial for given applications,taking into account function, health risk and economic aspects

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4. Course Content

MODULE - I: Biomaterials Introduction **15 HRS**

1.1 Introduction classification, Chemistry and characterization to biomaterial, biocompatibility with medical devices

1.2 Types of biomaterials degradable and resorbable materials, hydro gels and natural materials

1.3 Metallic biomaterial , ceramic biomaterials, composite for biomedical applications

1.4 Biomaterials and its applications - muscular skeletal systems

1.5 Delivery of drugs: for tissue engineering and regenerative medicine

MODULE - II: Biomaterials and their applications **15 HRS**

2.1 Collagen Definition, Types of Collagen, Structure of Collagen, Collagen Sources from Animal Origin Such as Bovine, Porcine, Marine and Fishes; Applications in Pharmaceutical, Tissue Engineering and Biomedical Industries.

2.2 Introduction to silk biomaterials: Silk fibroin and silk sericin proteins, molecular structure. Properties of silk fibroin: mechanical strength and biocompatibility. Spider dragline silk structure and properties, production from glands, spinning mechanism, Chemical Composition and Applications.

2.3 Structural Properties, Isolation and Processing Methods, Conversion of Chitin to Chitosan, Chemical and Biological properties; BioMedical Applications.

2.4 Physico Chemical Properties, Structure, Synthesis Methods, Mechanism of Action, Physiological Function, Wound and Skin Repairs, Receptors of Hyaluronic Acid and Biomedical Applications

2.5 Introduction, elastin- structure, properties, Production

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5. References

1. Biomaterial science: An introduction to materials in medicine, Buddy D. Ratner, et. al., Elsevier academic press 3 rd edition.

2. Biomaterial compositor by Luigi Ambrobio 210 CRC press

3. Styata V. Bhat, Biomaterial 2" d edition, Naros Publishing House, New Delhi

4. Biological Materials Science, Biological Materials, Bioinspired Materials, and Biomaterials; Marc André Meyers, Po-Yu Chen.

S. Biomaterials, Medical Devices, and Combination Products; Biocompatibility Testing and Safety Assessment; Shayne Cox Gad, Samantha Gad-McDonald

6. Biologically Responsive Biomaterials for Tissue Engineering, lulian Antoniac.

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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 identify material properties that are critical for metallic, polymer and ceramic biomaterials, or their combination used for tissue engineering and regenerative medicine

b)Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Module I & II	Assignments and Guest lecture

7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Participative Learning	Presentation Seminar and 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	Objective Test	Written Exam
CO2	Assignments and presentations	

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b) Model Question Paper- End Semester Exam

BIOMATERIALS FROM ANIMAL SOURCES

MODEL QUESTION PAPER
ILLUSTRATE WITH DIAGRAMS WHEREVER NECESSARY

SECTION-A

I ANSWER ANY 5 OUT OF 7 **5 Q X 6 M = 30 M**

1. Classify biomaterials, characterize its biocompatibility with medical devices
2. Distinguish between Metallic biomaterial , ceramic biomaterials, composite for biomedical applications.
3. What are the biomaterials used for musculoskeletal engineering?
4. Define Collagen, and mention its structure, sources and applications.
5. What are silk biomaterials and a note on its properties, chemical composition and its applications.
6. How is Chitin converted to Chitosan, add a note on its properties and applications.
7. What is elastin and explain its structure, properties and production

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BIOMATERIALS FROM ANIMAL SOURCES

MODEL QUESTION PAPER

SECTION A			5 Q X 6 M = 30 M	
Q.NO	**Question**	**Question**	**CO**	**BTL (Bloom's Taxonomy Level)**
1	Module 1	Classify biomaterials, characterize its biocompatibility with medical devices.	1	4
2	Module 1	Distinguish between Metallic biomaterial , ceramic biomaterials, composite for biomedical applications.	1	4
3	Module 1	What are the biomaterials used for musculoskeletal engineering ?	1	5
4	Module II	Define Collagen, and mention its structure, sources and applications.	2	1
5	Module II	What are silk biomaterials and a note on its properties, chemical composition and its applications.	2	1
6	Module II	How is Chitin converted to Chitosan ? Add a note on its properties and applications.	2	1
7	Module II	What is elastin and explain its structure, properties and production ?	2	1

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SEMESTER – V

SKILL ENHANCEMENT COURSE - III

CHEMINFORMATICS

1. Course Description

Programme: B.Sc.
Course Code: U24/CHE/SEC/301
Type of course: SEC
No. of credits: 2

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

2. Course Objectives

- To provide a basic learning in the emerging area of chemical sciences and usage of cheminformatics in the industry.

3. Course Outcome

This SEC paper will help students to enhance their overall skills

CO 1: Introduce students to different methods of cheminformatics, provide examples on the use of cheminformatics in modern drug research.

CO 2: Gain practical experience through exercises with representative methods used in cheminformatics.

4. **Course Content**

MODULE I: COMPUTER AIDED DRUG DESIGN **10 Hrs**

Introduction to CADD, Drug design and discovery, Lead Compounds, Lead optimization, Pharmacophore, Pharmacokinetics, ADME property, Toxicity. Prodrugs and Soft drugs, Introduction to Ligand-Based and Structure Based Drug design.

MODULE II: PRACTICE OF CHEMISTRY SOFTWARE **20 Hrs**

1. Construction of small molecules.
2. Energy minimization and generation of SMILES Notation.
3. Property calculation.
4. Searching RCSB for protein information, download protein and Literature search.
5. Protein preparation.
6. Active site identification and grid Generation.
7. Docking of ligands.
8. Protein ligand interaction studies.

5. References

1. Leach A.R., Gillet V.J., (2007): *An introduction to Chemoinformatics*. Springer: The Netherlands.
2. Gasteiger, J. & Engel, T. (2003) *Chemoinformatics: A text-book*. Wiley-VCH.
3. Gupta, S. P. (2011) *QSAR & Molecular Modelling*. Anamaya Pub.: New Delhi.

6. Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Local	Optimizing and Energy minimization of existing drugs, development of new materials with enhanced properties
Regional	Designing new drugs from SAR drive innovation in computational and medicinal chemistry
National	Formulating symbiosis, understanding drug activities in the regulation of pharmacodynamic and pharmacokinetic properties, innovation in healthcare
Global	Improved energy efficiency and sustainability, development of new synthetic strategies, broad implications for industries and technologies

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b. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Module 1	Medicinal chemists play a crucial role in the drug discovery process through the selection and synthesis of compounds that establish structure–activity relationships by using softwares.
EMP	Module 2	Involves the study of the effects of drug interactions on the target systems.

7. Pedagogy

S. No.	Student Centric Methods Adopted	Type / Description of Activity
1	Participative Learning	Online search engines for ADMET properties.
2	Experiential Learning	Practice of Chemistry software.

8. 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. Question Paper Pattern

EXTERNAL- MODEL QUESTION PAPER

PRACTICAL

Course Code: U24/CHE/SEC/301
Credits: 2

Max Time: 1 Hr
Max. Marks: 25

Answer the following.

1. Write about Molecular docking by iGEM Docking software and interpret the results. (CO 2) **L2** — 10M
2. Write a short note on generation of SMILES Notation. **(CO1) L1** — 5M
3. Viva — 5M
4. Record

Prepared by	Checked & verified by	Approved by
Name and Signature of the teaching faculty	Name and Signature of the HoD	Name and Signature of Principal
Dr. K. Susmitha Dr. M. Bhargavi M.Bhargavi	Dr. D. Sumalatha D. Sumalatha	Dr. Uma Joseph

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SEMESTER V

GENERIC ELECTIVE

CHEMISTRY OF COSMETICS AND FOOD TECHNOLOGY

1. Course Description

Programme: B.Sc
Course Code: U24/CHE/GE/501
Course Type: GE
No. of credits: 4

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

2. Course Objectives

- To learn the history of cosmetics and the importance of self grooming
- To learn the chemistry involved in cosmetics,chemicals/ natural products present in them. their usage in personal care.
- To understand the significance of various technological methods of food for better health.

3. Course Outcomes

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

CO1: Identify the types of cosmetics and learn about their chemistry.
CO2: Articulate the ingredients present in personal care products and apply it in their preparation.
CO3: Understand water purification process, and role of additives in food
CO4: Analyze the adulterants in food samples; learn steps involved in food processing and preservation

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4. Course Content

MODULE I: CHEMISTRY OF COSMETICS **15 hrs**

History of cosmetics, classification of cosmetics, professional image of self grooming, beauty and wellness.

Cosmetics emulsions: cream, cleansers, powders, moisturisers, sun screen, acne and anti aging creams.

Chemical peels and peeling agents, lasers and light devices, Electro Chemistry, bath salts, gels, soaps, bubble baths and scrubs.

MODULE II: PERSONAL CARE **15 hrs**

Skin Care

General Anatomy and Physiology of skin, Structure of skin, Growth and nutrition, dermal fillers

Hair Care

Structure of hair, growth of hair, Cosmetics used for hair – Shampoos, conditioners, Bleaches, hair dyes, hair gels, hair perms and hair relaxers/straighteners.

Nail Care

Structure of nail, cosmetics used for nail – Nail lacquer, nail polish remover, Manicure and Pedicure, nail care techniques.

Eye Care

Cosmetics used for the eye – eyebrow pencil, eye liner, eye shadows, mascaras. Eye concealer and eye creams.

Practical – Cosmetics Preparations

1. Preparation of Cold cream
2. Preparation of Talcum Powder.
3. Preparation of Bath salt.
4. Preparation of Lip Balm
5. Preparation of Nail Polish Remover
6. Preparation of Hand Wash.

MODULE III: INTRODUCTION TO FOOD, FOOD ADDITIVES & WATER PURIFICATION **15 Hrs**

Introduction - Food: source, functions of food- food groups- food guide- basic five food groups, usage of the food guide- food in relation to health- objectives of cooking.

Food Additives: Food additives: artificial sweeteners- saccharin, cyclomate, aspartame- food flavours- esters, aldehydes and heterocyclic compounds. Antioxidants. Food colours- changes in cooking, Restricted use. Spurious colours.Emulsifying agents, preservatives- leavening agents.Baking powder- Yeast. Taste Enhancers- MSG- vinegar.

Water: Purification processes- Ion exchangers , reverse osmosis, activated charcoal treatment. Use of chlorination, ozone and UV light disinfection. Specification of drinking water.

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MODULE IV: FOOD ADULTERATION, PROCESSING & PRESERVATION 15 hrs

Adulterants: Common adulterants in different foods- milk and milk products, vegetable oils, and fats, spices and condiments, cereals, pulses, sweetening agents and beverages.

Contamination with toxic chemicals- pesticides and insecticides. Methods involved in the analysis of detection and prevention of food adulteration.

Food deterioration, chemical methods of preservation and processing, and by freezing.

Heat processing of milk – pasteurization.Preservation of milk.Deep freeze preservation. Spray drying technique- milk powder, infant food preparation.

Practicals:

1. Estimation of total hardness of water.

2. Testing for the presence of adulterants in food samples.

5. References

1. Perry Romanowski, *Beginning Cosmetic Chemistry*, Allured Pub Corp.2009.
2. Dr. Ramesh Kumari, *Chemistry of Cosmetics*, Prestige Publishers.
3. Srilakshmi B., *Food Science*, New age International Pvt. Ltd. Publishers, III ed. 2003.
4. Shakuntala Manay N. and Shadaksharaswamy M. *FOODS: Facts and Principles*. New Age. International Pvt. Ltd. Publishers, II ed. 2002.
5. Norman N. Potter, *Food Science*, CBS publishers and distributors, New Delhi. 1994.
6. Swaminathan M. *Text Book on Food Chemistry*, Printing and Publishing CO., Ltd., Bangalore. 1993.
7. Swaminathan M. *Advanced Text Book on Food and Nutrition*, volume I and II Printing and Publishing CO., Ltd., Bangalore. 1993.

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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 cosmetic and food chemistry helps to have a well groomed healthy life
Regional	Learning the concepts of cosmetology and processing involved in the food industry, helps to choose the best products.
National	Acquire knowledge to identify and choose better health products.
Global	The widespread increase in the adoption of skin care and personal care products rise along with the global ageing population.

b. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Module 1 & 2	Students are taught to prepare various cosmetics using natural products and non toxic chemicals
EMP		
SD	Module 3 & 4	Students are trained to check the quality parameters of food and water samples.
EMP		

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7. Pedagogy

S. No.	Student Centric Methods Adopted	Type / Description of Activity
1.	Experiments	Students are taught to prepare cosmetics
2.	Presentations	Students present the toxic chemicals involved in various cosmetics products, and their alternatives
3.	Case studies	Students are made to evaluate various market samples of the same product.

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 10 M	Written Exam
CO2	Practical Skill test 10 M	
CO3	CIA 1 Written exam 10 M	
CO4	Practical Skill test 10 M	

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b. Model Question Paper- End Semester Exam

CHEMISTRY OF COSMETICS AND FOOD TECHNOLOGY
B.SC. III YEAR SEMESTER -V

TIME: 2hrs **Course Code: U24/CHE/GE/501**
Max. Marks: 60

SECTION –A (Essay Questions)

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

1. Classify cosmetics on the basis of their raw materials. (**L2**) 10M

OR

2. a) Outline the history of cosmetics. (**L2**) 5 M
b) Discuss the importance of self grooming and professional image. (**L2**) 5 M
3. a) Describe the structure of the nail with the help of a neat diagram. (**L1**) 5 M
b) List out the ingredients used in Shampoos. (**L1**) 5 M

OR

4. a) Describe chemical peels and types of peeling agents? (**L2**) 5 M
b) Explain the structure and growth cycle of hair. (**L2**). 5 M
5. a)Classify foods based on their function. (**L4**) 5 M
b) Explain the advantages of cooking. (**L2**) 5 M

OR

6. a) Define reverse osmosis. How does it help in water purification? (**L3**) 5 M
b) Emphasize the significance of chlorination of water. (**L2**) 5 M
7. a) Define food adulteration . Write any two tests to determine adulteration of food of your choice. (**L3**) 5 M
b) Illustrate the methods involved in the preservation of milk. (**L3**) 5 M

OR

8. a) Write a brief note on contamination of food by toxic chemicals. (**L1**) 5 M
b) Discuss about the various factors which lead to food deterioration. (**L2**) 5M

SECTION – B (Short answer questions)

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

9. What is the scope of beauty and wellness? (**L1**)
10. How do fillers work? (**L1**)
11. Outline five functions of talcum powder? (**L2**)
12. How is UV radiation used in water purification plants? (**L4**)
13. Elaborate the role of leavening agents in the food industry. (**L5**)
14. Explain Chemical methods of food preservation. (**L5**)

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FACULTY OF SCIENCE- DEPARTMENT OF CHEMISTRY
PRACTICAL SYLLABUS CBCS-2024
SEMESTER -V
EXPERIMENTS IN MEDICINAL & SUSTAINABLE CHEMISTRY
CHEMISTRY PRACTICALS – ELECTIVES 2

Program: B.Sc. Max. Hours: 30 Hrs
Course Code: U24/CHE/DSE/502/P Max. Marks: 50
Course: DSE 2 Hours per week: 2 Hrs
No. of Credits: 1

Course Objectives

- To apply the knowledge of synthetic methods in Chemistry to prepare drugs, nanoparticles.
- To design chemical products and processes for Green Chemistry.

Course Outcomes

CO1: Synthesize drugs, nanoparticles and developing green and sustainable methods.
CO2: Cut down the stream of chemicals pouring into the environment.

Synthesis and analysis

1. Preparation of Aspirin (conventional and green method)
2. Preparation of Paracetamol.
3. Preparation of Thiobarbeturic acid.
4. Preparation of Fluorescein.

Green Methods for the preparation of the following:

1. Preparation of Acetanilide.
2. Preparation of p-Bromo acetanilide.
3. Preparation of Dihydropyrimidinone.

Synthesis of Nanoparticles:

1. Preparation of nano silver.
2. Preparation of nano ZnO.
3. Preparation of Ferrofluid.
4. Preparation of nano CuO.

References

1. Krupadanam.D, VijayaPrasad.D, Varaprasad Rao.K, Reddy.K.L.N, Sudhakar.C, (2001), *Drugs,* Universities Press (India) Limited.
2. Patrick.G, (2001), Medicinal Chemistry, BIOS Scientific Publications
3. Ahluwalia V.K ,*Green Chemistry :Greener Alternatives for Synthetic Organic Transformation* :Narosa Publishing House
4. Ahluwalia V.K ,*Green Chemistry : Environmentally benign reaction* : Ane books Pvt.Ltd,2006
5. Kulkarni.K.S, (2011), *Nanotechnology- Principles & Practices*, Co-Published by Springer International Publishing Company, Switzerland, New Delhi, Capital Publishing Company.

6. Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Local	To develop products that benefit the environment either directly or indirectly.
Regional	Nanotechnology helps in improving many technology and industry sectors and even revolutionize.
National	The concepts of Green Chemistry reduces the use of energy and fuel by using renewable inputs wherever possible
Global	Recent advances in Medicinal Chemistry, Green Chemistry and Nanotechnology provide reliable synthetic pathways for sustainable development goals.

b. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	All	Educational tour to industries/factories to make students learn outside the classroom
ED	All	Case studies relevant to the problems, challenges and help students to develop solutions
EMP	All	Systematic and sustained effort to adapt specific skills for improving career goals

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7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Experiential Learning	Field Trips
2.	Participative Learning	Role play
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	CIA1-Written Exam	Written Exam
CO2	CIA1-Written Exam	
CO3	CIA2- Case Study	
CO4	CIA2- Presentations (poster/ ppt)	

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b. Model Question Paper - End Semester Exam

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FACULTY OF SCIENCE – DEPARTMENT OF CHEMISTRY

B.Sc. III YEAR SEMESTER -V

MEDICINAL & SUSTAINABLE CHEMISTRY

TIME: 2hrs **Course Code: U24/CHE/DSE/502**

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

SECTION –A (Essay Questions)

SECTION A - INTERNAL CHOICE			**4 X 10 M = 40M**	
Question Number	**Question**		**CO**	**BTL**
1	**Module 2**	a) Evaluate the structure of Penicillin G & discuss its commercial production 5M b) Explain briefly about diluents and stabilizing agents with examples. 5M **OR**	**CO 2**	**(Level I, V)**
2	**Module 2**	Outline the synthetic route and brief therapeutic action of i) Ciprofloxacin ii) Aspirin iii) Salbutamol iv) Omeprazole 10M	**CO 2**	**(Level II)**
3	**Module 1**	a) Summarize briefly about agonist and antagonist. 5M b) What are anaesthetic and antipyretic drugs? 5M **OR**	**CO 1**	**(Level I, II)**
4	**Module 1**	Describe in detail about ADME. 10M	**CO 1**	**(Level I)**
5	**Module 3**	a) List out the basic principles of green chemistry. 5M b) Simplify the atom economy? Calculate atom economy using suitable examples. 5M **OR**	**CO 3**	**(Level I, IV)**
6	**Module 3**	a) Assess the need for green chemistry. 5M b) Interpret the selection of solvents in green synthesis. 5M	**CO 3**	**(Level V)**

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7	Module 4	a) Give two methods for synthesis of Nanoparticles. 5M b) Compose a note on carbon nanotubes.5M **OR**	CO 4	(Level I, VI)
8	Module 4	a) Elaborate a note on Zeolites? 5M b) Compile the principle and working of STM. 5M	CO 4	(Level VI)
SECTION B – (Short answer questions) **ANSWER ANY 4 OUT OF 6**				**4 X 5M = 20 M**
9	Module 1	How would you explain drugs acting on the renal system?	CO 1	(Level II)
10	Module 2	Build a short note on clinical trials.	CO 2	(Level III)
11	Module 1	What are chemotherapeutic agents? Discuss about antimalarial drugs.	CO 1	(Level I)
12	Module 2	Construct briefly about computer aided drug designing.	CO 2	(Level III)
13	Module 3	Analyze the role of phase transfer catalyst in green synthesis.	CO 3	(Level IV)
14	Module 4	Give any four applications of Nanomaterials.	CO 4	(Level I)

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b. Model Question Paper - End Semester Exam

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FACULTY OF SCIENCE – DEPARTMENT OF CHEMISTRY

b. MODEL PAPER - B.Sc. III YEAR SEMESTER -V

MEDICINAL & SUSTAINABLE CHEMISTRY

TIME: 2hrs **Course Code: U24/CHE/DSE/502**

Max. Marks: 60

SECTION –A (Essay Questions)

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

1. a) Evaluate the structure of Penicillin G & discuss its commercial production(CO2) **L5** 5M
   b) Explain briefly about diluents and stabilizing agents with examples. (CO 2) **L1** 5M

OR

2. Outline the synthetic route and brief therapeutic action of 10M
   i) Ciprofloxacin ii) Aspirin iii) Salbutamol iv) Omeprazole (CO 2) **L2**
3. a) Summarize briefly about agonist and antagonist. (CO 1) **L2** 5M
   b) What are anaesthetic and antipyretic drugs? (CO 1) **L1** 5M

OR

4. Describe in detail about ADME. (CO 1) **L1** 10M
5. a) List out the basic principles of green chemistry. (CO3) **L1** 5M
   b) Simplify atom economy? Calculate atom economy using suitable examples.(CO3) **L4** 5M

OR

6. a) Assess the need for green chemistry. (CO3) **L5** 5M
   b) Interpret the selection of solvents in green synthesis. (CO3) **L5** 5M
7. a) Give two methods for synthesis of Nanoparticles. (CO4) **L1** 5M
   b) Compose a note on carbon nanotubes. (CO4) **L6** 5M

OR

8. a) Elaborate a note on Zeolites? (CO4) **L6** 5M
   b) Compile the principle and working of STM. (CO4) **L6** 5M

SECTION –B (Short Answer Questions)

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

9. How would you explain drugs acting on the renal system? (CO 1) **L2**
10. Build a short note on clinical trials. (CO 2) **L3**
11. What are chemotherapeutic agents? Discuss about antimalarial drugs. (CO 1) **L1**
12. Construct briefly about computer aided drug designing.(CO2) **L3**
13. Analyze the role of phase transfer catalyst in green synthesis. (CO3) **L4**
14. Give any four applications of Nanomaterials. (CO4) **L1**

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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	1	2	10	2	5
2	15	2	2	10	2	5
3	15	3	2	10	1	5
4	15	4	2	10	1	5

5. CO-PO Mapping

CO	PO	Cognitive Level	Classroom sessions(hrs)
1	2,5	Understanding	15
2	1,7	Applying & Analysing	15
3	2,7	Remembering	15
4	4	Creating & Evaluating	15

Prepared by	Checked & verified by	Approved by
Shikha Chander M. Deepthi Name and Signature of the teaching faculty Dr. Shikha Chander M. Deepthi	D. Sumalatha Name and Signature of the HoD Dr. D. Sumalatha	Name and Signature of the Principal Dr. Uma Joseph

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Skill Enhancement Course III

GREENHOUSE TECHNOLOGY

1. Course Description

Programme:	**B. Sc**	**Max. Hours:**	**30**
Course Code:	**U24/BOT/SEC/501**	**Hours per week:**	**2**
Type of Course:	**SEC - 501**	**Max. Marks:**	**30**
No. of Credits:	**2**		

2. Course Objectives

1. To Define the concepts, meaning, definitions & fundamentals of life skills.
2. To Adapt a thorough grounding in the basics of the subject and to develop and articulate respect for the diversity of talents, ways of knowing and learning

3. Course Outcomes

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

CO 1: Explain the concepts of greenhouses and the various irrigation methods and fertilizers used in greenhouse cultivation.
CO 2: Analyze various plant protection practices in green houses and identify the applications of greenhouse technology.

4. Course Content

Module I **15 hours**

1.1 Introduction; scope- classification of greenhouses- construction of greenhouse- heating unit-cooling unit-environmental control (light and temperature). Net-poly houses-low-cost green houses. Root media for greenhouses

1.2 Fertilizers: Organic and inorganic, liquid fertilizers, application of fertilizers. Water in the Greenhouse; Irrigation system in green houses-misting, Drip irrigation- micro irrigation, water quality, water sanitation

Module II **15 hours**

2.1 Plant Protection in Greenhouses; Diseases of greenhouse plants (bacterial, fungal, nematodes and viral diseases). Management of pest and diseases- integrated peat management

2.2 Applications of greenhouse Technology: Importance of greenhouse technology. Micropropagation and greenhouse planting of tissue culture transplants. Advantages and disadvantages of greenhouse technology. Seed production, cut flower gardening.

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5. Reference Books

1. Dubey R.C.2006. A text book of Biotechnology. S. Chand and Company. New Delhi
2. Sheela V.L.2011. Horticulture. MJP Publishers. Chennai,
3. Prasad S; Kumar U. 2012. Green House Management for Horticulture Crops. Agrobios India.
4. Pant V and Nelson. 1991. Green House Operation and Management. Bali publication. New Delhi
5. Introduction to soil science: http://www.agrimoon.com/wpcontent/uploads/Introduction- to soil- sciences.pdf
6. Greenhouse applications: http://www.lingegas.com/en/products_and-supply /fumigants/ carbon dioxide in agriculture/greenhouse_application/index.html
7. Role of greenhouse technology in agricultural engineering

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6. Syllabus Focus

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

Local /Regional/National /Global Development Needs	**Relevance**
Regional needs	The course can offer employment opportunities, empowers local farmers, conserves water resources, and supports sustainable farming practices, contributing to overall regional prosperity.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	**Syllabus Content**	**Description of Activity**
SD	Module I	Students can develop the skill set in understanding the precise structural assembly, and strategic placement of materials to create a controlled environment conducive to optimal plant growth in the greenhouse and poly houses.
	Module II	Students can develop the skill set in understanding to manage to protect and prevent various diseases in the greenhouse plants.

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7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Participative Learning	Presentations and Group discussions based on syllabus topics.
2.	Experiential Learning	Field Trips to research organizations having greenhouse facility.
3.	Problem solving	Minor research Projects like setting up small green houses at home and monitoring plant growth.

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, Practical project	Written Exam
CO2	CIA 2 – Test 2: MCQ's / Presentation / Seminar topics	

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b) Model Question Paper – End Semester Exam Theory

GREENHOUSE TECHNOLOGY

Course Code: U24/ BOT/ SEC/501 **Max. Marks: 30**

Time: 1 Hour

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

1. Define greenhouse and list the classification of greenhouse
2. Outline the advantages and disadvantages of greenhouse technology
3. Discuss on the root media for green houses
4. Define fertilizers and illustrate their applications.
5. Explain the construction of Irrigation system in greenhouse
6. Illustrate the methods involved in pest and disease management
7. Compute the application of greenhouse technology.
8. Explain the Seed production in cut flower gardening

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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CBCS 2024

HERBALS FOR BEAUTY & PRIMARY HEALTH CARE

SEMESTER V

GENERIC ELECTIVE

HERBALS FOR BEAUTY & PRIMARY HEALTH CARE

1. Course Description

Program:	**B. Sc**	**Max. Hours:**	**60**
Course Code:	**U24/ BOT/ GE/501**	**Hours per week:**	**4**
Type of Course:	**GE**	**Max. Marks:**	**60**
No. of Credits:	**4**		

2. Course Objectives

1. To interpret the appropriate use of herbal medicines; and
2. To integrate herbal medicines into the mainstream health maintenance.

3. Course Outcomes

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

CO1: Develop an increased awareness and appreciation of medicinal plants.
CO2: Recognize the function of therapeutic herbs.
CO3: Interpret the utilization and preservation of locally accessible natural remedies for first-aid.
CO4: Analyze the knowledge concerning medicinal plants and pharmacognosy and the methods of evaluation of crude drugs.

4. Course Content

Module I: Medicinal Plants **15 Hours**

1.1. Importance of medicinal plants – role in human health care – health and balanced diet.
1.2. Plants in day-to-day life – *Ocimum sanctum,* Turmeric, Mint, *Hibiscus, Aloe vera.* Nutritive and medicinal value of some fruits (Guava, Sapota, Orange, Mango, Banana, Lemon, Pomegranate) and vegetables–Greens (*Moringa,* Cabbage, Spinach, Fenugreek, Amaranth).
1.3. Root – Sarpagandha, Fruit – Amla, Bulb –Garlic, Rhizome – Ginger, Seed – Castor, Bark – Cinchona, Leaves – Neem: Flower – Clove.

Module II: Herbal & crude drugs preparation **15 Hours**

2.1. Herbal Preparation.
2.2. Classification of medicinal plants based on their effects with special reference to India.
2.3. Preparation of crude and commercial drugs. Making infusion, decoction, lotion, washers, insect repellents, suppositories, tincture, making herbal syrups, poultice, plasters, ointments, herbal oils and herbal salves.

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Module III: Cultivation of Medicinal plants & nutraceuticals **15 Hours**

3.1 Cultivation of Medicinal plants – *Aloe vera*, *Ocimum* and Mint.
3.2. Plants as nutraceuticals – *Moringa oleifera*, Wheat grass, Fenugreek.
3.3. Visit a well-maintained medicinal plant garden and submit a report.

Module IV: Pharmacognosy & Adulteration **15 Hours**

4.1 Pharmacognosy: Introduction and scope. Traditional plant medicines as a source of new drugs – the process of modern drug discovery using ethnopharmacology – Taxol and Artemisinin, as examples.
4.2 Adulteration of crude drugs and methods of identification – some examples.
4.3 Plant crude drugs: Types, methods of collection, processing and storage practices. Evaluation Of crude drugs.

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5. Reference Books

1. Sumathi, R., Madambi and Rajagopal, M. v. 1997. Fundamentals of foods and nutrition. New Age International Pvt. Ltd., New Delhi.
2. Girija Khanna.1986. Herbal Remedies –Vikas Publishing house Ltd, New Delhi.
3. Kokate and Gokhale – Pharmacognosy -Nirali Prakashan, New Delhi.
4. Rastogi R. R and B.N. Mehrotra.1993. *Compendium of Indian Medicinal Plants*. Vol.I & Vol.II. CSIR, Publication and Information Directorate, New Delhi.
5. Kirtikar K.R. and Basu B.D.1995.*Indian Medicinal Plants*.VolI. International Book Distributors, Booksellers &Publishers. Dehradun.
6. T. Pullaiah. *Medicinal Plants* in A.P., 2002.Regency Publications, Meerut.
7. Ashutosh Kar,2006. *Pharmacognosy and Pharmabiotechnology*. New age International, New Delhi

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6. Syllabus Focus

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

Local /Regional/National /Global Development Needs (Mention any ONE at a time)	**Relevance** (Describe how the course addresses the need) Maximum 15 words
Local needs	Herbals for beauty and health support local development through natural remedies and wellness solutions.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP (Mention any ONE of the above at a time)	**Syllabus Content** (Mention Module No. or part content applicable)	**Description of Activity** (Activity that will be conducted in class to support the focus of SD/ED/EMP in the syllabus content)
ED	Module II	Prepare herbal oils, washes, insect repellents and ointments
	Module III	Cultivation of medicinal plants

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7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Participative Learning	• Information collection from Online Video Resources • Cultivated medicinal herb or plants- seminar presentation
2.	Experiential Learning	• Cultivation of Medicinal Plants at home. • To examine the active component present in the grown medicinal plants
3.	Problem solving	• Homemade Organic Pesticide Preparation and spray Methods in varied concentrations.

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 – Growing medicinal herbs / Assignment	

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b) Model Question Paper – End Semester Exam Theory

HERBALS FOR BEAUTY & PRIMARY HEALTH CARE

Course Code: U24/ BOT/ GE/501
TIME: 2 Hours **MAXMARKS: 60**

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)

I. Answer All questions: **Marks: 4 x 10 - 40**

1. Describe the importance of medicinal plants and its role in health.
   OR
2. Assess the nutritive and medicinal value of orange and clove

3. Describe in detail the classification of medicinal plants.
   OR
4. Explain the method of preparation of crude and commercial drugs with examples
5. Describe in detail the cultivation of Mint.
   OR
6. What are Nutraceuticals? Explain in detail about Wheat grass and Moringa plant as Nutraceuticals

7. Explain adulteration in crude drug and methods for identification.
   OR
8. Discuss types, collection and processing of crude extracts.

Section-B (Short Essay Type)

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

9. Explain the medicinal role of Turmeric
10. Formulate the preparation of any natural insect repellent
11. Discover the role of Aloe vera
12. Explain the characters of Artemisinin as a crude drug
13. Elaborate the use of herbal syrups
14. Evaluation of crude drugs

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SECTION A - INTERNAL CHOICE				4Q X 10 M = 40 M
Question Number	Question	Question	CO	BTL (Blooms Taxonomy Level)
1	Module 1	Describe the importance of medicinal plants and its role in health.	CO 1	Level I, II
2	Module 1	Assess the nutritive and medicinal value of orange and clove	CO 1	Level V
3	Module 2	Describe in detail the classification of medicinal plants.	CO 2	Level I, II
4	Module 2	Explain the method of preparation of crude and commercial drugs with examples	CO 2	Level II
5	Module 3	Describe in detail the cultivation of Mint	CO 3	Level I, II
6	Module 3	What are Nutraceuticals? Explain in detail about Wheat grass and Moringa plant as Nutraceuticals	CO 3	Level I, II
7	Module 4	Explain adulteration in crude drug and methods for identification.	CO 4	Level II
8	Module 4	Discuss types, collection and processing of crude extracts.	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	Explain the medicinal role of Turmeric	CO 1	Level II
10	Module 2	Formulate the preparation of any natural insect repellent	CO 2	Level VI
11	Module 3	Discover the role of Aloe vera	CO 3	Level IV
12	Module 4	Explain the characters of Artemisinin as a crude drug	CO 4	Level II
13	Module 2	Elaborate the use of herbal syrups	CO 2	Level VI
14	Module 4	Evaluation of crude drugs	CO 4	Level V

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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	CO 1	2	10 each	1	5
2	15	CO 2	2	10	1	5
3	15	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	1-7	Creating	15
2	1-7	Remembering	15
3	1-7	Understanding	15
4	1-7	Analyzing	15

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SEMESTER - V
IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

1. Course Description

Programme: B.Sc **Max. Hours: 60**
Course Code: U24/ZOO/DSE/501 **Hours per week: 4**
Course Type: DSE - 1 **Max. Marks: 100**
No. of credits: 4

2. Course Objectives

- To understand concepts in Immunology
- To understand and apply the fundamental principles of Animal Biotechnology.

3. Course Outcomes

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

CO1: To remember how immune response is generated in humans to foreign antigens and B and the T cell involved responses.

CO2: To apply the adverse effect of immune system including allergy, hypersensitivity and Autoimmunity.

CO3: To understand the Molecular Techniques used in Gene manipulation

CO4: To evaluate the principles of recombinant DNA technology in medical sciences and industry

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4. Course Content

Module I: Immunology – Basic concepts; antigens and antibodies **15 HRS**

1.1 Cells of immune system
1.2 Primary and secondary Organs of immune system
1.3 Types of Immunity – Innate and acquired
1.4 Basic properties of antigens, Structure, function and types of antibodies.
1.5 Antigen-antibody reactions,
1.6 T-Cell and B-Cell activation

Module II: Working of an Immune system; Immune system in health and disease 15 HRS

2.1 Structure and functions of major histocompatibility complexes.
2.2 Basic properties and functions of Cytokines, Interferons and complement proteins
2.3 Humoral and Cell mediated immunity.
2.4 Types of hypersensitivity.
2.5 Concepts of autoimmunity and immunodeficiency.
2.6 Introduction to Vaccines and types of Vaccines

Module III: Animal Biotechnology-Introduction & Molecular Techniques in Gene manipulation **15 HRS**

3.1 Concept and Scope of Animal Biotechnology.
3.2 Cloning vectors: Plasmids, Cosmids, Phagemids, Lambda Bacteriophage,YAC and Expression vectors (characteristics)
3.3 Restriction enzymes - Enzymatic cleavage of DNA and Ligatio
3.4 3.4 Southern, Northern and Western blotting; DNA sequencing: Sanger method
3.5 Polymerase Chain Reaction, DNA Fingerprinting and DNA microarray.

Module IV: Animal Biotechnology – Genetically modified organisms & Applications

15 HRS

4.1 Recombinant DNA technology and its applications
4.2 Transgenesis – Methods of Transgenesis.
4.3 Production of Transgenic animals and Application of Transgenic animals.
4.4 Stem cells –types and their applications

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5. References

1. Brown, T.A. (1998). *Molecular Biology Labfax II: Gene Cloning and DNA Analysis*. II Edition, Academic Press, California,USA.
2. Glick, B.R. and Pasternak, J.J. (2009). *Molecular Biotechnology - Principles and Applications of Recombinant DNA*. IV Edition, ASM press, Washington,USA.
3. Griffiths,A.J.F.,J.H.Miller,Suzuki,D.T.,Lewontin,R.C.andGelbart,W.M.(2009).
4. *An Introduction to Genetic Analysis*. IX Edition. Freeman and Co., N.Y., USA.
5. Snustad, D.P. and Simmons, M.J. (2009). *Principles of Genetics.* V Edition, John Wiley and SonsInc.
6. Watson, J.D., Myers, R.M., Caudy, A. and Witkowski, J.K. (2007). *Recombinant DNA- Genes and Genomes- A Short Course*. III Edition, Freeman and Co., N.Y.,USA.
7. Beauchamp, T.I. and Childress, J.F. (2008). *Principles of Biomedical Ethics.* VI Edition, Oxford UniversityPress.
8. Kindt, T. J., Goldsby, R.A., Osborne, B. A. and Kuby, J (2006). Immunology, VI Edition. W.H.
9. David, M., Jonathan, B., David, R. B. and Ivan R. (2006). Immunology, VII Edition, Mosby, Elsevier Publication.
10. Abbas, K. Abul and Lechtman H. Andrew (2003.) Cellular and Molecular Immunology. V Edition. Saunders Publication.

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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 Development Needs	Immune system function and dysfunction is at the root of many diseases and gaining deeper knowledge of its workings.
National Development Needs	Biotechnology helps improve yields, lower costs, and reduce pesticide use in the country.
Global Development Needs	Understanding immunity, the immune response and biotechnological tools is crucial in today's world, not just because of the impact on fighting the COVID-19 pandemic, but also because of the life-saving treatments provided for cancer patients through cutting-edge immunotherapies.

b)Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
Skill Development	Module III	Workshop on Molecular Techniques used in Gene manipulation
Entrepreneurship Development	Module IV	Hands on training - Recombinant DNA technology in medical sciences and industry

7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Experiential Learning	Field Trips
2.	Experiential Learning	Interactive Classroom games/Quiz
3.	Participative Learning	Presentation (ppt, poster, model)
4	Participative Learning	Seminar/Workshop
5	Problem solving	Role Play / Case Studies

8. Course Assessment Plan

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

CO	Continuous Internal Assessments CIA -40%	End Semester Examination-60%
CO1	CIA-1 Written Test	Written Exam
CO2	CIA-1 Written Test	
CO3	CIA-2 Objective Test	
CO4	CIA-2 Assignment	

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b) Model Question Paper- End Semester Exam

IMMUNOLOGY & ANIMAL BIOTECHNOLOGY
THEORY - MODEL QUESTION PAPER

SUBJECT CODE: U24/ZOO/DSE/501 **TIME: 2HRS**
CREDITS: 4 **MAX MARKS: 60**

ILLUSTRATE WITH DIAGRAMS WHEREVER NECESSARY

SECTION-A

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

1. What is Immunity and explain Innate and acquired immunity.

OR

2. Explain the structure, functions and types of an antibody.

3. What is hypersensitivity & explain types of hypersensitivity

OR

4. Explain the Structure and functions of major histocompatibility complex.

5. Give a brief account of different kinds of vectors used for gene cloning.

OR

6. Describe techniques of Southern, Northern and Western blotting and describe the utility of these techniques in molecular probing for biotechnology research.

7. What Recombinant DNA technology and what are its applications

OR

8. Production of Transgenic animals and Application of Transgenic animals

SECTION- B

II Answer any 4 out of 6 Questions **4x5=20 M**

9. Secondary lymphoid organs
10. Antigen Antibody reaction
11. Cell mediated immunity
12. Vaccines
13. Restriction enzymes
14. Transgenesis

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IMMUNOLOGY & ANIMAL BIOTECHNOLOGY
THEORY - MODEL QUESTION PAPER

SECTION A - INTERNAL CHOICE			4 Q X 10 M = 40 M	
Question Number	**Question**	**Question**	**CO**	**BTL (Bloom's Taxonomy Level)**
1	Module 1	What is Immunity and explain Innate and acquired immunity.	CO 1	2
2	Module 1	Explain the structure, functions and types of an antibody.	CO 1	2
3	Module 2	What is hypersensitivity & explain types of hypersensitivity	CO 2	2
4	Module 2	Explain the Structure and functions of major histocompatibility complexes.	CO 2	1 and 2
5	Module 3	Give a brief account of different kinds of vectors used for gene cloning.	CO 3	2
6	Module 3	Describe techniques of Southern, Northern and Western blotting and describe the utility of these techniques in molecular probing for biotechnology research.	CO 3	1 and 2
7	Module 4	What Recombinant DNA technology and what are its applications	CO 4	4
8	Module 4	Production of Transgenic animals and Application of Transgenic animals	CO 4	4
SECTION B - ANSWER ANY 4 OUT OF 6			**4 Q X5 M = 20 M**	
9	Module 1	Secondary lymphoid organs	CO 1	1
10	Module 2	Antigen Antibody reaction	CO 2	1
11	Module 3	Cell mediated immunity	CO 3	2
12	Module 4	Vaccines	CO 4	1
13	Module 3	Restriction enzymes	CO 3	2
14	Module 4	Transgenesis	CO 4	4

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IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY – PRACTICALS

Course Code: U24/ZOO/DSE/501/P **Hours per week : 2**
No. of credits : 1 **Max. Marks : 50**

1. **Course objective:**
   To understand concepts in Immunology and fundamental principles of biotechnology.

2. **Course outcomes:**
   - To remember the histology of organs involved in immune response.
   - To evaluate the amount of RBC & WBC in the given samples.
   - To understand the different blotting techniques

Immunology

a. Identification of Blood groups

b. Histological study of spleen, thymus and lymph nodes (through prepared slides)

c. Enumeration of RBC & WBC from a given blood sample

d. Enumeration of Differential count of WBC from a given blood sample

e. Demonstration of ELISA & Immunoelectrophoresis

f. Identification of Autoimmune disease through charts.

Animal Biotechnology

Study the following techniques through photographs / virtual lab

a. Southern blotting

b. Western blotting

c. DNA sequencing (Sanger's method)

d. DNA fingerprinting

e. Identification of Vectors

f. Identification of Transgenic animals

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IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY PRACTICALS
MODEL PAPER

Subject Code: U24/ZOO/DSE/501/P **Max. Marks – 50**
No. of Credits:1 **Time – 2 hour**

I. Major experiment **15 M**

- Identification of Blood groups
- Enumeration of RBC from a given blood sample
- Enumeration of WBC from a given blood sample
- Enumeration of Differential count of WBC from a given blood sample

II. Minor experiment **10 M**

Identification of the technique shown in the photograph / virtual lab.

- Southern blotting
- Western blotting
- DNA sequencing (Sanger's method)
- DNA fingerprinting

III. Identification of spots **5x3 = 15 M**

Identify the given spots from A to E with a neat and well labeled diagram.

- Histological study of spleen, thymus and lymph nodes
- Identification of Autoimmune disease through charts.
- Identification of Vectors
- Identification of Transgenic animals

IV. Record **5 M**

V. Viva **5 M**

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

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(An Autonomous College Affiliated to Osmania University)
FACULTY OF SCIENCE- DEPARTMENT OF CHEMISTRY
THEORY SYLLABUS CBCS-2024
SEMESTER -V
INSTRUMENTAL METHODS OF ANALYSIS

1. Course Description

Program: B.Sc.
Course Code: U24/CHE/DSE/501
Course: DSE- 1
No. of Credits: 4

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

2. Course Objectives

- To understand the importance of separation techniques such as solvent extraction and to explore the principles and procedures of chromatographic techniques including paper, thin layer,
- To learn the principles of column, ion exchange chromatography, HPLC and GLC.
- To delve into the principle and instrumentation of UV/Visible spectrophotometry, and its application to the quantitative analysis of various ions.
- An approach towards the principle and application of electroanalytical analysis.

3. Course Outcomes

CO1: Understand various separation techniques and choose the most appropriate analytical technique for a variety of samples.
CO2: Explain the theoretical principles of various separation techniques in chromatography and their typical applications.
CO3: Interpret the theoretical principles of selected instrumental methods with spectrophotometric methods.
CO4: Review and assessment of electro analytical methods.

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4. Course Content

MODULE I: CHROMATOGRAPHY I — 15 Hrs

Solvent Extraction- Principle, Methods of extraction: Batch extraction, continuous extraction and counter current extraction. Application – Determination of Iron (III).

Chromatography: Classification of chromatographic methods, principles of differential migration, adsorption phenomenon, nature of adsorbents, solvent systems.

Thin layer Chromatography (TLC): Advantages, preparation of plates, development of the chromatogram, Detection of the spots, factors affecting R_f values and applications.

Paper Chromatography: Principle, choice of paper and solvent systems, development of chromatogram – ascending, descending, radial and two dimensional chromatography and applications.

MODULE II: CHROMATOGRAPHY II — 15 Hrs

Column Chromatography: Principle, Types of stationary phases, Column packing – Wet packing technique, Dry packing technique. Selection criteria of mobile phase (solvents) for eluting, polar, non-polar compounds and its applications.

Ion exchange chromatography: Principle, cation and anion exchange resins, its application in separation of ions.

Gas Chromatography: Theory and instrumentation (Block Diagram), Types of stationary phases and carrier gases (mobile phase).

High performance liquid chromatography: Theory and instrumentation, stationary phases and mobile phases. Analysis of paracetamol.

MODULE III: COLORIMETRY AND SPECTROPHOTOMETRY — 15 Hrs

General features of absorption – spectroscopy, transmittance, absorbance, and molar absorptivity. Beer Lambert's law and its limitations, difference between Colorimetry and Spectrophotometry.

Instruments – Single beam UV- Visible Spectrophotometer, Double beam UV- Visible Spectrophotometer. Lamps used as energy sources. Verification of Beer's law. Estimation of iron in water samples by thiocyanate method. Estimation of (i) Chromium and (ii) Manganese in steel.

IR Spectrophotometer: Principle, Sources of Radiations, Sampling, Block diagram of FT-IR Spectrophotometer.

MODULE IV: ELECTROANALYTICAL METHODS — 15 Hrs

Types of Electroanalytical Methods.

I) Interfacial methods – a) Potentiometry: Principle, Electrochemical cell, Electrodes- (i) Indicator and (ii) Reference electrodes – Normal Hydrogen Electrode, Quinhydrone Electrode,

Saturated Calomel Electrode. Numerical Problems. Application of Potentiometry – Assay of Sulphanilamide

b) Voltammetry – three electrode assembly; Introduction to types of voltammetric techniques, micro electrodes, over potential and Polarization.

II) Bulk methods – Conductometry, Conductivity Cell, Specific Conductivity, Equivalent Conductivity. Numerical problems. Applications of conductometry. Estimation of Cl - using $AgNO_3$. Determination of Aspirin with KOH.

5. References

1. David Krupadanam, *Analytical Chemistry*, Universities Press (India) Limited.
2. S. M. Khopkar, *Basic concepts of Analytical Chemistry*, New Age International Publishers.
3. Gurdeep R. Chatwal, Sham K. Anand, *Instrumental methods of Chemical analysis*, Himalaya Publishing House.
4. D.A. Skoog, F.J. Holler, T.A. Nieman, *Principles of Instrumental Analysis*, Engage earning India Edn.
5. D. A. Skoog, D.M. West, F.J. Holler, *Fundamentals of Analytical Chemistry* 6 th Edn., Saunders College Publishing, Fort worth (1992).
6. Cooper, T.G. *The Tools of Biochemistry*, John Wiley and Sons, N.Y. USA.16, 1977.
7. Vogel, A. I. *Vogel's Qualitative Inorganic Analysis* 7th Edn, Prentice Hall.
8. Vogel, A. I. *Vogel's Quantitative Chemical Analysis* 6th Edn, Prentice Hall.
9. Gary D. Christian, *Analytical Chemistry* 7th edition. (2004).
10. B. K. Sharma, *Industrial Chemistry* (including Chemical Engineering). edn. (1997).

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St. FRANCIS COLLEGE FOR WOMEN, BEGUMPET, HYDERABAD-500016
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FACULTY OF SCIENCE- DEPARTMENT OF CHEMISTRY
PRACTICAL SYLLABUS CBCS-2024
SEMESTER -V
~~CHEMISTRY PRACTICALS – ELECTIVES 1~~ Experiments in Physical Chemistry & Sustainable Chemistry

Program: B.Sc.
Course Code: U24/CHE/DSE/501/P
Course: DSE 1 & 2
No. of Credits: 1

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

Course Objectives

- To equip the students with required analytical skills for potentiometry, TLC and determination of partition coefficient.
- To investigate analytes with the use of scientific instruments.

Course Outcomes

CO 1: Acquire the skills to determine partition coefficient, perform TLC and potentiometric titrations.
CO 2: The techniques such as spectroscopy, electrochemical analysis provides adequate knowledge and applications.

Distribution Experiments:

1. Distribution of partition coefficient of acetic acid in water and butanol.
2. Distribution of benzoic acid in benzene and water.

Potentiometry:

3. Titration of strong acid vs strong base (HCl vs NaOH)

4,

Thin Layer Chromatography :

4. Determination of Rf values and identification of Organic compounds: preparation of and separation of 2,4-dinitrophenylhydrazone of acetone and acetophenone using toluene and light petroleum (40:60)
5. Separation of ortho & para-nitroaniline mixtures.

Electrochemistry

6 Titration of Strong acid Vs Strong base (HCl Vs NaOH)

~~6~~ 7. Determination of dissociation constant (Ka) of acetic acid by conductivity measurements

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Colorimetry

7. Verification of Beer's Law using $KMnO_4$ and determination of the concentration of the given solution.

Adsorption

8. Adsorption of acetic acid on animal charcoal, Verification of Freundlich adsorption isotherm.

Reference Books

1. Khosla, B. D.; Garg, V. C. &Gulati, A. Senior Practical Physical Chemistry, R.
2. Chand & Co.: New Delhi (2011).
3. Mendham, J, *Vogel's Quantitative Chemical Analysis:* Pearson, 2009.
4. Analytical Chemistry 7th edition by Gary D. Christian (2004)
5. Vogel, A. I. Vogel's Qualitative Inorganic Analysis 7th Ed., Prentice Hall. 11. Vogel, A. I.
6. Vogel's Quantitative Chemical Analysis 6th Ed., Prentice Hall.

(9) Green Synthesis of Acetanilide

(10) Green Synthesis of (P-Bromo acetanilide) Aspirin

(11) Green Synthesis of Dihydropyrimidinone

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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	To produce graduates with sound theoretical knowledge and technical skills.
Regional	To motivate students towards research.
National	To address the challenges with their innovative contributions for the benefit of mankind.
Global	To instill the essence of professionalism, ethical commitment to become researchers with core human values.

b. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	1,2,3,4	Upskilling, cross skilling and reskilling
ED	1,2,3,4	Guest lecture Skill test involving creative thinking and problem solving
EMP	1,2,3,4	Using an engaging curriculum for career exploration

7. Pedagogy

S.No.	Student Centric Methods Adopted	Type / Description of Activity
1.	Experiential Learning	Science Experiments
2.	Participative Learning	Presentation
3.	Problem solving	Research Projects

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8. Course Assessment Plan

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

CO	Continuous Internal Assessments CIA - 40%	End Semester Examination- 60%
CO1	CIA1-Written Exam	Written Exam
CO2	CIA1-Written Exam	
CO3	CIA2- Mini Project	
CO4	CIA2- Paper Presentation	

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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. III YEAR SEMESTER -V
INSTRUMENTAL METHODS OF ANALYSIS
Course Code: U24/CHE/DSE/501

TIME: 2 Hrs
Max. Marks: 60

SECTION –A

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

1. Evaluate the principle of paper chromatography and development of chromatogram by four methods. (CO1) **L5** 10M

OR

2. a) Explain the Craig's counter current process of solvent extraction. (CO2) **L1** 5M
   b) Summarize a short note on Soxhlet extraction technique. (CO1) **L2** 5M

3. a) Apply the theory involved in Gas chromatography and draw the block diagram. (CO2) **L3** 5M
   b) Give the analysis of paracetamol by HPLC (CO3) **L1** 5M

OR

4. Describe the principle of Ion exchange chromatography. Give an account of cation and anion exchange resins. (CO1) **L2** 10M
5. a) Estimation of iron in water sample samples by thiocyanate method. (CO3) **L6** 5M
   b) Explain the instrumentation of the double beam spectrophotometer. (CO3) **L1** 5M

OR

6. Analyse the Principle, Sources of Radiations, Sampling technique in IR spectrophotometry. (CO3) **L4** 10M
7. a) Describe the working of Calomel electrode with a neat diagram (CO4) **L2** 5M
   b) How chloride ions are estimated using silver nitrate by conductometry. (CO4) **L1** 5M

OR

8. Determine the EMF of a cell initially of an acid- base titration where 25 ml 0.1 M of HCl is titrated potentiometrically against standard 0.1 M NaOH using hydrogen electrode as indicator electrode and saturated calomel electrode as reference electrode. What would be the EMF after the addition of 20, 25 and 30 ml of NaOH solution? (CO4) **L5** 10M

SECTION –B

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

9. Illustrate any two applications of TLC (CO2) **L2**
10. Give an account of different types of column packing. (CO1) **L1**
11. Distinguish between Colorimetry and Spectrophotometry. (CO3) **L4**
12. Classify chromatographic methods and explain any two. (CO1) **L1**
13. Outline a short note on three electrode assembly. (CO4) **L2**
14. Explain the instrumentation and principle of HPLC. (CO2) **L1**

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. III YEAR SEMESTER -V
INSTRUMENTAL METHODS OF ANALYSIS

TIME: 2 Hrs **Course Code: U24/CHE/DSE/501**
Max. Marks: 60 **Credits: 4**

SECTION –A

SECTION A - INTERNAL CHOICE				**4 X 10 M = 40M**
Question Number	**Question**		**CO**	**BTL**
1	**Module 1**	Evaluate the principle of paper chromatography and development of chromatogram by four methods. 10M **OR**	**CO 1**	**(Level V)**
2	**Module 1**	a) Explain the Craig's counter current process of solvent extraction. 5M b) Summarize a short note on Soxhlet extraction technique. 5M	**CO 1**	**(Level I, II)**
3	**Module 2**	a) Apply the theory involved in Gas chromatography and draw the block diagram. 5M b) Give the analysis of paracetamol by HPLC 5M **OR**	**CO 2**	**(Level I, III)**
4	**Module 2**	Describe the principle of Ion exchange chromatography. Give an account of cation and anion exchange resins. 10M	**CO 2**	**(Level II)**
5	**Module 3**	a) Estimation of iron in water sample samples by thiocyanate method. 5M b) Explain the instrumentation of the double beam spectrophotometer. 5M **OR**	**CO 3**	**(Level I,VI)**
6	**Module 3**	Analyze the principle, sources of radiations, sampling technique in IR spectrophotometry. 10M	**CO 3**	**(Level IV)**

7	**Module 4**	a) Describe the working of Calomel electrode with a neat diagram 5M b) How chloride ions are estimated using silver nitrate by conductometry. 5M **OR**	**CO 4**	**(Level I, II)**
8	**Module 4**	a) What is the principle and instrumentation of potentiometry 5M b) Explain the three electrode assemblies of voltammetry. 5M	**CO 4**	**(Level I)**
SECTION B – (Short answer questions) **ANSWER ANY 4 OUT OF 6** **4 X 5M = 20 M**				
9	**Module 2**	Illustrate any two applications of TLC	**CO 2**	**(Level II)**
10	**Module 1**	Give an account of different types of column packing.	**CO 1**	**(Level I)**
11	**Module 3**	Distinguish between Colorimetry and Spectrophotometry.	**CO 3**	**(Level IV)**
12	**Module 1**	Classify chromatographic methods and explain any two.	**CO 1**	**(Level I)**
13	**Module 4**	Calculate the equivalent conductivity 0.1N concentrated sulphuric acid solution given specific conductivity is equal to 4×10^{-2} Sm-1.	**CO 4**	**(Level II)**
14	**Module 2**	Explain the instrumentation and principle of HPLC.	**CO 2**	**(Level I)**

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SEMESTER - V

INTEGRATED PEST MANAGEMENT

1. **Course Description**

Programme: B.Sc **Max. Hours: 60**
Course Code: U24/ZOO/GE/501 **Hours per week: 4**
Course Type: Generic Elective **Max. Marks:100**
No. of credits: 4

2. Course Objectives

- To study the challenges associated with insect and pest control.
- To learn IPM and to apply the economic threshold concept to interpret if a pest population has reached an economic threshold.
- To understand pest control tactics, pest resistance integration in pest management.

3. Course Outcomes

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

CO1: To describe characteristics of insect pests and factors that make them successful pests, as well as beneficial characteristics of insects , history of agricultural pesticides and the factors that contribute to pests evolving resistance to pest control strategies.

CO2: To analyze pest management scenarios and describe the agroecosystem benefits of IPM.

CO3: To understand the significant role of biological and genetic control in controlling the pest population.

CO4: To remember the optimum use of insecticides and pesticides in controlling the pest population.

4. Course Content

MODULE I: Pest **15 HRS**

1.1 Introduction, History and origin

1.2 Definition of pest and its ecology

1.3 Pest population dynamics

1.4 Economic injury level (EIL), Economic threshold

1.5 Pest surveillance

MODULE II: Integrated Pest Management **15 HRS**

2.1 Concepts of IPM

2.2 Components of IPM

2.3 Major IPM strategies

2.4 Strategies for IPM Mechanical, Physical, Cultural and Biological

MODULE III: Biological and Genetic Control **15 HRS**

3.1 Introduction and Principle

3.2 Biocontrol agents

3.3 Parasitoids, predators and pathogens (NPV, Bacteria, fungi and nematodes) Merits and demerits

3.4 Genetic Control - sterile insect technique; sterile insect release method

MODULE IV: Chemical Control **15 HRS**

4.1 Classification of insecticides

4.2 Insecticide adjuvant and formulation

4.3 Chemical control with reference to organochloride, organophosphate carbamates

4.4 Synthetic pyrethroids; fumigants; pheromones legal or regulatory control- Quarantine acts

5. References:

1. K.P.Srivastava: A Textbook of Applied EntomologyVol.i&ii.Kalyani Publishers New Delhi.

2. B.V.David and KumaraSwamy. Elements of Economic Entomology

3. B.V.David and KumaraSwamy.Elements of Economic Entomology

4. Pedigo,L.P.Entomology and Pest Management .Prentice-Hall ,New Delhi

5.. Pradhan,S. Insect Pests of Crops, National Book Trust,New Delhi

6. Agricultural Pests of India and SouthEast Asia by Atloal A.S. Kalyani Publisher, New Delhi

7. Insect Pest of Crops by S. Pradhan, National Book Trust, New Delhi

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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	The students can spread awareness about pest problems while limiting unwanted effects on the environment and on health.
Regional	It brings sustainable development at regional level which impacts the national parameters of growth and development .
National	The course equips the students with the knowledge of different pests from different ecosystems across the nation, and also provides their management strategies.
Global	Reducing the use of pesticides reduces health risks in the world.

b)Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
Skill Development	Module II - IV	Project work will be given on spreading the awareness to the farmers in IPM strategies. Field visits to local farmlands to get awareness of pest management techniques .
Entrepreneurship Development	Module I & II	Projects will be given finding ways or solutions for on sustainable living
Employability	Module I - IV	Field works on analysing different strategies adopted in croplands to manage pests. Internships in institutes such as IICT.

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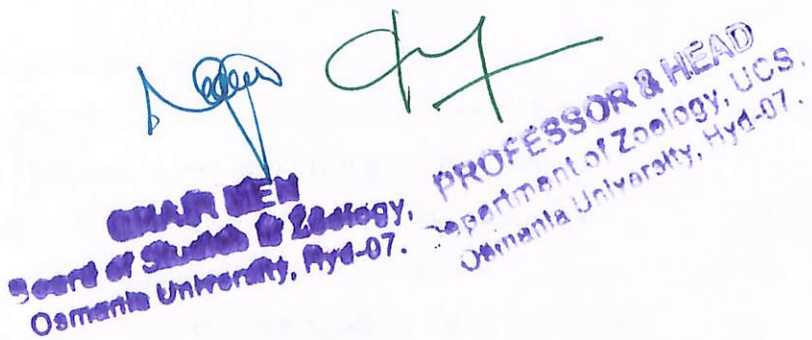
7. Pedagogy

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

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	



b) Model Question Paper- End Semester Exam

INTEGRATED PEST MANAGEMENT

MODEL QUESTION PAPER

Course Code: U24/ZOO/GE/501 **Max Marks: 60**
Credits : 4 **Time : 2Hrs**

ILLUSTRATE WITH DIAGRAMS WHEREVER NECESSARY

SECTION-A

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

1. Define Pest. Can we call any species a pest ?Justify.

OR

2. Explain Economic Injury Level.

3. Examine the strategies of IPM.

OR

4. What facts support the concept of IPM.

5.Elaborate on Biological control of pest management.

OR

6.What is the main idea of Genetic control , summarize its applications.

7.Classify the insecticides and examine the positive and negative impacts of using insecticides.

OR

8. Analyse the role of Pheromones in IPM.

SECTION- B

Answer any FOUR **5 x4 =20 M**

9. Analyse the pest population dynamics.
10. Identify the common mistakes committed by farmers while controlling infestation in your locality. How would you help them solve the problem ?
11. Compare the Parasitoids, Predators and pathogens.
12. Interpret the harmful effects of fumigation.
13. Give a critical appreciation of Sterile insect technology.
14. IPM is an approach to sustainable development. Prove the statement.

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INTEGRATED PEST MANAGEMENT

MODEL QUESTION PAPER

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 Pest. Can we call any species a pest ?Justify.	CO 1	Level II
2	Module 1	Explain Economic Injury Level.	CO 1	Level I & Level II
3	Module 2	Examine the strategies of IPM.	CO 2	Level IV
4	Module 2	What facts support the concept of IPM.	CO 2	Level V
5	Module 3	Elaborate on Biological control of pest management.	CO 3	Level IV
6	Module 3	What is the main idea of Genetic control , summarize its applications.	CO 3	Level VI
7	Module 4	Classify the insecticides and examine the positive and negative impacts of using insecticides.	CO 4	Level IV
8	Module 4	Analyse the role of Pheromones in IPM.	CO 4	Level IV

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SECTION B - ANSWER ANY 4 OUT OF 6			4 Q X 5 M = 20 M	
9	Module 1	Analyse the pest population dynamics ?	CO 1	Level IV
10	Module II	Identify the common mistakes committed by farmers while controlling infestation in your locality. How would you help them solve the problem?	CO 2	Level III
11	Module III	Compare the Parasitoids, Predators and pathogens.	CO 3	Level II
12	Module IV	Interpret the harmful effects of fumigation.	CO 4	Level II
13	Module III	Give a critical appreciation of Sterile insect technology.	CO 3	Level V
14	Module II	IPM is an approach to sustainable development. Prove the statement.	CO 2	Level V

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FACULTY OF SCIENCE- DEPARTMENT OF CHEMISTRY
THEORY SYLLABUS CBCS-2024
SEMESTER -V
MEDICINAL & SUSTAINABLE CHEMISTRY

1. Course Description

Program: B.Sc.
Course Code: U24/CHE/DSE/502
Course: DSE 2
No. of Credits: 4

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

2. Course Objectives

- To introduce students to the action of drugs on biological systems.
- To explain & discuss the drug formulation, synthetic routes and discovery process.
- To study the effects of chemical synthesis upon the environment and the importance of developing green techniques.
- Introduce students to the importance of nanoparticles, their properties and applications.

3. Course Outcomes

CO 1: Learn and understand the action of drugs on biological systems.
CO 2: Discuss the synthetic routes and therapeutic activity for some commonly used drugs.
CO 3: Acquire the ability to design green synthetic routes replacing conventional pathways.
CO 4: Apply the knowledge of Nanotechnology to synthesize, characterize Nanoparticles and explain their properties.

4. Course Content

MODULE I: MEDICINAL CHEMISTRY I **12 Hrs**

Terminology in Medicinal Chemistry **2 Hrs**
Disease, Drug, Pharmacology, Pharmacophore, Pharmacodynamics, Pharmacokinetics, metabolites, antimetabolites, agonist, antagonist and therapeutic index.

Nomenclature **1 Hr**
Chemical name, Generic name and Trade names. Trade names for the given generic names – (i) Aspirin (ii) Amoxycillin (iii) Ciprofloxacin (iv) Paracetamol (v) Mebendazole.

ADME **3 Hrs**
a) Absorption: Definition, absorption of drugs across the membrane – active and passive absorption, routes of administration of drugs. b) Distribution: definition and effect of plasma protein binding. c) Metabolism: definition, phase I and phase II reactions. d) Elimination: definition and renal elimination.

Classification of Drugs
Classification of Drugs based on therapeutic action–Chemotherapeutic agents, and Pharmacodynamic agents (brief explanation for the following)
(i) Chemotherapeutic agents **1 Hr**

Antimalarials – Chloroquine; Antibiotic – Amoxicillin; Antitubercular drugs – isoniazid; Antiprotozoals – metronidazole: Antibacterial – Sulphanilamide; Anthelmintics – Albendazole.

(ii) Pharmacodynamic agents **5 Hrs**

(a) Drugs acting on CNS: General (thiopental sodium)and local anaesthetics (Benzocaine),Analgesics (Ibuprofen),Antipyretics (Aspirin, Paracetamol), Sedatives & Hypnotics (Phenobarbital), Anticonvulsants (Diazepam), Anti-psychotics (Chlorpromazine) and Antidepressants (Fluoxetine).

(b) Drugs acting on PNS: Adrenergic (Salbutamol, Propranolol) & Cholinergic (Carbachol, Diphenhydramine) Drugs.

(c) Drugs acting on Cardiovascular System-Antihypertensive Drugs (Captopril, Nifedipine)

(d) Drugs acting on renal system- Diuretic drugs (Furosemide, Acetazolamide)

MODULE II: MEDICINAL CHEMISTRY II **11 Hrs**

SAR studies **1 Hr**

Introduction to Structure Activity Relationship Studies, Lead modification strategies.SAR of benzodiazepines.

Antibiotics **1 Hr**

Discovery- Isolation of Penicillin, Structure of Penicillin G, Penicillin-V, Penicillin-O &Amoxycillin.

Synthetic route and brief therapeutic action of the following drugs: **4 Hrs**

Chemotherapeutics: Chloroquine, Ciprofloxacin, Sulphanilamide, Metronidazole.

Drugs to treat metabolic disorders: Paracetamol, Salbutamol, Omeprazole, Mephensin, Aspirin, Thiobarbituric acid, L-Dopa, Phenobarbital, Oil of wintergreen, Nifedipine

Formulations **2 Hrs**

(a) Introduction: Need of conversion of drugs into medicine. Additives & their role (Brief account only). (b) Classification of Drug formulations: Oral, parenterals and topical dosage forms – advantages and disadvantages.

Brief Overview of Drug Development Process: **3 Hrs**

(a) Lead drug-Definition & example (b) Drug design-i) Based on Lead compound ii) Based on Target Structure(De novo drug design) iii) Computer aided Drug Design (Molecular modelling) (c) Drug Testing-Clinical trials.

MODULE III: GREEN CHEMISTRY **15 Hrs**

Principles of Green Chemistry and some real world cases

What is Green Chemistry? Twelve principles of Green Chemistry with their explanation and examples. Atom economy, Evaluation of the type of the reaction: Rearrangements, Addition, Substitution, elimination and Pericyclic reactions. Selection of solvent: Aqueous phase reactions, Reactions in ionic liquids, Solid supported synthesis, Solvent free reactions (solid phase reactions). Green catalysts: Phase transfer catalysts (PTC), Biocatalysts. Energy requirements for reactions – alternative sources of energy: use of microwaves and ultrasonic energy.

Microwave assisted reactions in water: Oxidation of toluene and alcohols, Claisen rearrangement, Pinacol pinacolone rearrangement.

Microwave assisted reactions in organic solvents, Diels-Alder reaction and Decarboxylation reaction, Fries rearrangement.

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Ultrasound assisted reactions: sonochemical Simmons-Smith Reaction (Ultrasonic alternative to Iodine), Cannizaro reaction, Strecker synthesis, Friedal crafts acylation.
Green Synthesis of the following compounds: adipic acid, catechol, disodium iminodiacetate (alternative to Strecker synthesis).

MODULE IV: NANOTECHNOLOGY 15 Hrs

Nanotechnology: Introduction, types of crystalline nano materials, synthesis of nano materials- physical, chemical and biological methods (one method each).
Characterization of nanoparticles using electron microscope, tunneling microscope and X-ray diffraction. (Elementary treatment only)
Properties of nanomaterials-structure of nanomaterials, mechanical, electrical conductivity, optical, melting point, luminescence, magnetic properties
Special nanomaterials- fullerenes, carbon nanotubes, porous silicon, zeolites, aerogels, self-assembled nanoparticles, their preparation and structure.
Applications-- Electronics, energy, automobiles, fuel cells, home appliances, Nanolithography, defense, medicine, nanotechnology and environment.

5. References

1. G.L. David Krupadanam, D.Vijaya Prasad, K.Varaprasad Rao, K.L.N. Reddy, C. Sudhakar, *Drugs*, Universities Press (India) Limited 2007.
2. Graham L. Patrick, *An Introduction to Medicinal Chemistry,* Oxford University Press, New York. 1995
3. *Chemistry text book for B.Sc., Vol. IV* published by Telugu Academy, Govt. of Telangana.
4. Ahluwalia V.K, *Green Chemistry: Environmentally benign reaction*: Ane books Pvt.Ltd,2006.
5. Ahluwalia V.K & Kidwai M, *New Trends in Green Chemistry:* Springer,1 edition (29thFeb 2004)
6. Kulkarni. K.S, (2011), *Nanotechnology- Principles & Practices* Co-Published by Springer International Publishing Company, Switzerland, New Delhi, Capital Publishing Company.
7. Nanochemistry- A Chemical Approach to Nano World by Kusum Sharma
8. Poole Jr. C.P & Owens. J.F (copyright, reprint, 2006). *Introduction to Nanotechnology*, New Delhi, Wiley India(P) Ltd.
9. Thomas Nogrady, Medicinal Chemistry, Oxford Univ. Press, New York.2005.
10. David William and Thomas Lemke, Foye's Principles of Medicinal Chemistry, Lippincott Williams & Wilkins, 2008.
11. AshutoshKar Medicinal Chemistry, New Age International, 2005.
12. O.D. Tyagi & M.Yadav Synthetic Drugs by, Anmol Publications, 1998.
13. Medicinal Chemistry by Alka L. Gupta, Pragati Prakashan.
14. Samuel Delvin, *Green Chemistry* :Sarup & Sons(2005)
15. Anastas, P.T & Warner, J.C, *Green Chemistry: Theory and Practice:* Oxford University Press (1998).
16. T. Pradeep *Nano: The Essentials* , McGraw-Hill Education.
17. CNR Rao et.al. *Chemistry of nanomaterials: Synthesis, Properties and applications*
18. Gurdeep R. Chatwal *Chemistry and industry*
19. https://www.electrical4u.com/properties-of-superconductors/
20. Poole Jr. C.P & Owens. J.F(copyright, reprint,2006).*Introduction to Nanotechnology*, New Delhi,Wiley India(P) L

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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	To develop products that benefit the environment either directly or indirectly.
Regional	Nanotechnology helps in improving many technology and industry sectors and even revolutionize.
National	The concepts of Green Chemistry reduces the use of energy and fuel by using renewable inputs wherever possible
Global	Recent advances in Medicinal Chemistry, Green Chemistry and Nanotechnology provide reliable synthetic pathways for sustainable development goals.

b. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	All	Educational tour to industries/factories to make students learn outside the classroom
ED	All	Case studies relevant to the problems, challenges and help students to develop solutions
EMP	All	Systematic and sustained effort to adapt specific skills for improving career goals

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7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Experiential Learning	Field Trips
2.	Participative Learning	Role play
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	CIA1-Written Exam	Written Exam
CO2	CIA1-Written Exam	
CO3	CIA2- Case Study	
CO4	CIA2- Presentations (poster/ ppt)	

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b. Model Question Paper - End Semester Exam

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FACULTY OF SCIENCE – DEPARTMENT OF CHEMISTRY

B.Sc. III YEAR SEMESTER -V

MEDICINAL & SUSTAINABLE CHEMISTRY

TIME: 2hrs **Course Code: U24/CHE/DSE/502**

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

SECTION –A (Essay Questions)

SECTION A - INTERNAL CHOICE			**4 X 10 M = 40M**	
Question Number	**Question**		**CO**	**BTL**
1	**Module 2**	a) Evaluate the structure of Penicillin G & discuss its commercial production 5M b) Explain briefly about diluents and stabilizing agents with examples. 5M **OR**	**CO 2**	**(Level I, V)**
2	**Module 2**	Outline the synthetic route and brief therapeutic action of i) Ciprofloxacin ii) Aspirin iii) Salbutamol iv) Omeprazole 10M	**CO 2**	**(Level II)**
3	**Module 1**	a) Summarize briefly about agonist and antagonist. 5M b) What are anaesthetic and antipyretic drugs? 5M **OR**	**CO 1**	**(Level I, II)**
4	**Module 1**	Describe in detail about ADME. 10M	**CO 1**	**(Level I)**
5	**Module 3**	a) List out the basic principles of green chemistry. 5M b) Simplify the atom economy? Calculate atom economy using suitable examples. 5M **OR**	**CO 3**	**(Level I, IV)**
6	**Module 3**	a) Assess the need for green chemistry. 5M b) Interpret the selection of solvents in green synthesis. 5M	**CO 3**	**(Level V)**

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7	**Module 4**	a) Give two methods for synthesis of Nanoparticles. 5M b) Compose a note on carbon nanotubes.5M **OR**	**CO 4**	**(Level I, VI)**
8	**Module 4**	a) Elaborate a note on Zeolites? 5M b) Compile the principle and working of STM. 5M	**CO 4**	**(Level VI)**
SECTION B – (Short answer questions) **ANSWER ANY 4 OUT OF 6**			**4 X 5M = 20 M**	
9	**Module 1**	How would you explain drugs acting on the renal system?	**CO 1**	**(Level II)**
10	**Module 2**	Build a short note on clinical trials.	**CO 2**	**(Level III)**
11	**Module 1**	What are chemotherapeutic agents? Discuss about antimalarial drugs.	**CO 1**	**(Level I)**
12	**Module 2**	Construct briefly about computer aided drug designing.	**CO 2**	**(Level III)**
13	**Module 3**	Analyze the role of phase transfer catalyst in green synthesis.	**CO 3**	**(Level IV)**
14	**Module 4**	Give any four applications of Nanomaterials.	**CO 4**	**(Level I)**

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b. Model Question Paper - End Semester Exam

St. FRANCIS COLLEGE FOR WOMEN, BEGUMPET, HYDERABAD-500016

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FACULTY OF SCIENCE – DEPARTMENT OF CHEMISTRY

b. MODEL PAPER - B.Sc. III YEAR SEMESTER -V

MEDICINAL & SUSTAINABLE CHEMISTRY

TIME: 2hrs **Course Code: U24/CHE/DSE/502**

Max. Marks: 60

SECTION –A (Essay Questions)

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

1. a) Evaluate the structure of Penicillin G & discuss its commercial production(CO2) **L5** 5M

   b) Explain briefly about diluents and stabilizing agents with examples. (CO 2) **L1** 5M

OR

2. Outline the synthetic route and brief therapeutic action of 10M
   i) Ciprofloxacin ii) Aspirin iii) Salbutamol iv) Omeprazole (CO 2) **L2**
3. a) Summarize briefly about agonist and antagonist. (CO 1) **L2** 5M

   b) What are anaesthetic and antipyretic drugs? (CO 1) **L1** 5M

OR

4. Describe in detail about ADME. (CO 1) **L1** 10M
5. a) List out the basic principles of green chemistry. (CO3) **L1** 5M

   b) Simplify atom economy? Calculate atom economy using suitable examples.(CO3) **L4** 5M

OR

6. a) Assess the need for green chemistry. (CO3) **L5** 5M

   b) Interpret the selection of solvents in green synthesis. (CO3) **L5** 5M
7. a) Give two methods for synthesis of Nanoparticles. (CO4) **L1** 5M

   b) Compose a note on carbon nanotubes. (CO4) **L6** 5M

OR

8. a) Elaborate a note on Zeolites? (CO4) **L6** 5M

   b) Compile the principle and working of STM. (CO4) **L6** 5M

SECTION –B (Short Answer Questions)

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

9. How would you explain drugs acting on the renal system? (CO 1) **L2**
10. Build a short note on clinical trials. (CO 2) **L3**
11. What are chemotherapeutic agents? Discuss about antimalarial drugs. (CO 1) **L1**
12. Construct briefly about computer aided drug designing.(CO2) **L3**
13. Analyze the role of phase transfer catalyst in green synthesis. (CO3) **L4**
14. Give any four applications of Nanomaterials. (CO4) **L1**

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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	1	2	10	2	5
2	15	2	2	10	2	5
3	15	3	2	10	1	5
4	15	4	2	10	1	5

5. CO-PO Mapping

CO	PO	Cognitive Level	Classroom sessions(hrs)
1	2,5	Understanding	15
2	1,7	Applying & Analysing	15
3	2,7	Remembering	15
4	4	Creating & Evaluating	15

Prepared by	Checked & verified by	Approved by
Shikha Chander M. Deepthi Name and Signature of the teaching faculty Dr. Shikha Chander M. Deepthi	D. Sumalatha Name and Signature of the HoD Dr. D. Sumalatha	Name and Signature of the Principal Dr. Uma Joseph

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SEMESTER - V

PHYSIOLOGICAL CHEMISTRY & ENDOCRINOLOGY

1. **Course Description**

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

Course Code: U24/ZOO/DSE/502 **Hours per week: 4**

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

No. of credits: 4

2. Course Objectives

- The student will be able to list the major complex biomolecules found in living cells, three of which are found on food labels and the basis for grouping of biomolecules into those four groups.
- The student will be able to develop an understanding of the role of the endocrine system in maintaining homeostasis and health.

3. Course Outcomes

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

CO1: The students will identify various biomolecules that help in functioning and organization of living cells.

CO2: To understand the classification of lipids & enzymes and to know the significance of their action of mechanism

CO3: The students will learn the basic classification of endocrine hormones which provide the feedback mechanism to analyse the concept of homeostasis

CO4: The student will remember the structure and the role of hormones in maintaining body function and the approaches for the diagnosis, management and prevention of endocrine disorders.

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4. Course Content

MODULE I: Biomolecules of Importance **15 HRS**

1.1 Types of biomolecules - Carbohydrates, Proteins, Lipicls, Nucleic acids and their significance in biological systems.

1.2 Classification of protein; Function of proteins based on their chemical nature, Protein Metabolism: Transamination, deamination, urea cycle

1.3 Classification and function of carbohydrates: Carbohydrate metabolism: Glycolysis, Kreb's cycle, electron transport and oxidative phosphorylation

MODULE II: Lipids and enzyme Classification **15 HRS**

2.1 Lipids: nomenclature and classification of lipids, Fatty acid synthesis and beta oxidation of lipids

2.2 Cholesterol synthesis and metabolism of steroidal hormones

2.3 Enzyme definition, nomenclature, classification and Enzyme kinetics, Line weaver-Burk plot

2.4 Mechanism of enzymes: Action, enzyme inhibition, coenzymes

MODULE III: Introduction to Endocrinology **15 HRS**

3.1 Concept and Scope of endocrinology; Hormones as chemical messengers. Classification of hormones

3.2 Mechanism of action of amino acid derivatives, peptide hormones and steroid hormones.

3.3 Positive feedback mechanism and Negative feedback control

3.4 Concept of internal environment and homeostasis.

MODULE IV: Endocrine Glands and their Hormones **15 HRS**

4.1 Hypothalamus and its Hormones.

4.2 Structure, hormones and functions of Pituitary gland.

4.3 Structure, hormones and functions of Thyroid, Parathyroid, thymus

4.4 Structure, hormones and functions of Adrenal, Pancreas, Pineal

4.5 Hormones and reproduction

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5. References

1. A.L., Lehninger, PRINCIPLES OF BIOCHEMISTRY (1982), Worth Publishers, Inc. NewYork.
2. E.E. Conn and P.K. Stumpf. OUTLINES OF BIOCHEMISTRY (1976) Wiley Eastern, New Delhi.
3. Biochemistry U. Satyanarayana Books and Allied (P) Ltd. Kolokatta ISBN 0-87893- 214-3.
4. J.L Jain . Textbook of biochemistry.
5. Ramakrishnan - Medical Biochemistry.
6. D.M. Vasudevan - TextBook of Biochemistry.
7. A.C. Deb - TextBook of Biochemistry.
8. General Endocrinology C. Donnell Turner Pub- Saunders Toppan
9. Endocrinology: An Integrated Approach; Stephen Nussey and Saffron Whitehead. Oxford: BIOS Scientific Publishers; 2001.
10. Hadley, M.E. and Levine J.E. 2007. Endocrinology, 6th Edition. Pearson Prentice-Hall, Pearson Education Inc., New Jersey.
11. Vertebrate Endocrinology by David O. Norris,

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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	The paper helps students develop thinking skills and awareness. Metabolism and hormones control our temperature, sleep, mood, stress, growth and development. Students are encouraged to think scientifically and develop critical-thinking skills.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Module III & Module IV	Guest Lecture
EMP	Module III & Module IV	Mini Projects in diagnostic centres

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7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Participative Learning	Seminar Presentation
2.	Experiential Learning	Field trips
3.	Participative Learning	Group Discussion
4	Experiential Learning	Industrial visits
5	Experiential Learning	Quiz
6	Problem Solving	Research Project

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 Test	Written Exam
CO2	CIA I Written Test	
CO3	CIA II Assignment	
CO4	CIA II Objective Test	

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b) Model Question Paper- End Semester Exam

PHYSIOLOGICAL CHEMISTRY & ENDOCRINOLOGY

MODEL QUESTION PAPER

ILLUSTRATE WITH DIAGRAMS WHEREVER NECESSARY

SECTION-A

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

1. What are proteins and explain their functions based on their chemical nature.

Or

2. Explain Kreb's cycle and oxidative phosphorylation
3. What are lipids and explain Fatty acid synthesis and beta oxidation of lipids

Or

4. Define enzyme and explain enzyme kinetics and classification.
5. What are chemical messengers and explain its classification.

Or

6. Define the term Homeostasis, explain its concept by giving examples.
7. Give an account of the structure and functions of the hormones of the thyroid gland,

Or

8. "Adrenal glands produce lifesaving Hormones", Comment.

SECTION- B

II. Answer any Four Out Of Six Questions **5x4=20 M**

9. Biomolecules
10. Glycolysis
11. Cholesterol
12. Positive feedback mechanism
13. Pineal Gland
14. Sex hormones

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PHYSIOLOGICAL CHEMISTRY & ENDOCRINOLOGY

MODEL QUESTION PAPER

SECTION A - INTERNAL CHOICE			4 Q X 10 M = 40 M	
Question Number	**Question**	**Question**	**CO**	**BTL (Bloom's Taxonomy Level)**
1	Module 1	What are proteins and explain their functions based on their chemical nature.	CO 1	2
2	Module 1	Explain Krebs cycle and oxidative phosphorylation	CO 1	2
3	Module 2	What are lipids and explain Fatty acid synthesis and beta oxidation of lipids	CO 2	2
4	Module 2	Define enzyme and explain enzyme kinetics and classification.	CO 2	1 and 2
5	Module 3	What are chemical messengers and explain its classification.	CO 3	2
6	Module 3	Define the term Homeostasis, explain its concept by giving examples.	CO 3	1 and 2
7	Module 4	Give an account of the structure and functions of the hormones of the thyroid gland	CO 4	4
8	Module 4	"Adrenal glands produce lifesaving Hormones", Comment.	CO 4	4
SECTION B - ANSWER ANY 4 OUT OF 6			**4 Q X5 M = 20 M**	
9	Module 1	Glycolysis	CO 1	1
10	Module 2	Cholesterol	CO 2	1
11	Module 3	Positive feedback mechanism	CO 3	1
12	Module 4	Pineal Gland	CO 4	1
13	Module 1	Biomolecules	CO 1	1
14	Module 4	Sex hormones	CO 4	1

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PHYSIOLOGICAL CHEMISTRY & ENDOCRINOLOGY PRACTICALS

Course Code: U24/ZOO/DSE/502/P **Hours per week:2**
No. of credits: 1 **Max. Marks: 50**

Course objective:

1. Understand the various tests performed to identify the various biomolecules.
2. Apply the knowledge while working in medical laboratory to diagnose different hormone disorders

Course outcomes:

1. The student will be able to explain the basis of biological macromolecules.
2. The student will be able to apply the knowledge, while working in a medical laboratory to diagnose different hormone disorders.

1. Identification of carbohydrates - Molisch test, Benedict's/Fehling's test, Iodine test, Barfoed's test.
2. Identification of proteins-Biuret test, Sodium hydroxide test
3. Identification of amino acids-Xanthoproteic test, Ninhydrin test, Millon's test
4. Identification of lipids-Sudan-IV test.
5. Histology of Endocrine glands, Pituitary, Thyroid, Parathyroid, Thymus, Adrenal, Pancreas, Ovary & Testis, Uterus.
6. Effect of Eyestalk ablation on Blood Glucose levels in Crabs.
7. Identification of Gonadotropin in Human urine samples.
8. Effect of Tyrosine and thiourea (antithyroid agent) on oxygen consumption in fish.

PHYSIOLOGICAL CHEMISTRY & ENDOCRINOLOGY
MODEL QUESTION PAPER
PRACTICAL

Course Code: U24/ZOO/DSE/502/P **Max Time: 2 hrs**
Credits: 1 **Max. Marks: 50**

I Major experiment -
Qualitative Analysis & Identification of the given Unknown sample. **15 M**
Identification of carbohydrates - Molisch test, Benedict's/Fehling's Test, Iodine test, Barfoed'sTest.

Identification of amino acids-Xanthoproteic test, Ninhydrin test, Millon's test

Effect of Eyestalk ablation on Blood Glucose levels in Crabs by Anthrone method.

Effect of Tyrosine and thiourea (antithyroid agent) on oxygen consumption in fish.

II Minor experiment-

Identification of the given unknown sample. **10 M**

Identification of proteins-Biuret test, Sodium hydroxide test

Identification of lipids-Sudan- IV test.

Identification of Gonadotropin in Human urine samples.

III . IDENTIFY THE GIVEN SPOTS FROM A TO E **5 x 3 =15 M**

Pituitary, Thyroid, Parathyroid, Thymus, Adrenal, Pancreas, Ovary & Testis, Uterus

IV. RECORD **5 M**

V. VIVA **5 M**

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

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SEMESTER V

PLANT PHYSIOLOGY & METABOLISM

1. Course Description

Program:	**B. Sc**	**Max. Hours:**	**60**
Course Code:	**U24/ BOT/ DSE/501**	**Hours per week:**	**4**
Type of Course:	**DSE-1**	**Max. Marks:**	**60**
No. of Credits:	**4**		

2. Course Objectives

1. To describe physiological and biochemical processes in plants – cell, tissues, organ and whole plant level.
2. To interpret regulation mechanisms of physiological and metabolic processes as well as their dependence on endogenous and environmental signals.

3. Course Outcomes

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

CO1: Interpret the concept of water and mineral absorption in plant system and the significance of stress physiology
CO2: Illustrate the various pathways in photosynthesis and summarise the mechanism of translocation of organic solutes
CO3: Compare the various pathways in respiration and illustrate the mechanism of biological nitrogen fixation and ammonia assimilation
CO 4: Describe the importance of plant growth and development alongside the role of growth regulators and physiology of flowering

4. Course Content

Module I Plant water relations and Mineral Nutrition 15 Hours

1.1. Plant water relations: Diffusion, imbibition, osmosis; osmotic and pressure potentials; absorption, transport of water, ascent of sap; Transpiration; stomatal structure and movement.
1.2. Mineral nutrition: Essential macro and micro mineral nutrients and their role; symptoms of mineral deficiency; absorption of mineral ions; passive and active processes.
1.3.Stress physiology: concept and plant responses to water, salt and temperature stresses.
1.4.Introduction to Hydroponic technology

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Module II Photosynthesis and Translocation **17 Hours**

2.1 Enzymes: Nomenclature, properties, classification and factors regulating enzyme action.

2.2 Photosynthesis: Photosynthetic pigments, absorption and action spectra; Red drop and Emerson Enhancement effect; concept of two photosystems, mechanism of photosynthetic electron transport and evolution of oxygen; photophosphorylation;

2.3 Carbon assimilation pathways: C_3, C_4 and CAM; photorespiration.

2.4 Translocation of organic substances; Mechanism of phloem transport; source-sink relationships.

Module III Respiration and Nitrogen metabolism **16 Hours**

3.1. Respiration: Aerobic and Anaerobic; Glycolysis, Kreb's cycle.

3.2 Electron transport system, mechanism of oxidative phosphorylation, pentose phosphate pathway.

3.3. Nitrogen metabolism: Biological nitrogen fixation, nitrate reduction.

3.4. Ammonia assimilation.

Module IV Plant growth and Development **12 Hours**

4.1. Growth and development: Definition, phases and kinetics of growth. Plant movements: tropic movements - geotropism and phototropism; nastic movements - seismonastic and nyctinastic movements

4.2. Physiological effects of phytohormones- Auxins, Gibberellins, Cytokinins, Abscisic acid, Ethylene and Brassinosteroids.

4.3. Physiology of flowering and photoperiodism, role of phytochrome in flowering.

4.4 Allelopathy

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5. Reference Books

1. Hopkins, W. G. 1995. *Introduction to Plant Physiology*. John Wiley & Sons Inc., New York, USA.
2. Jain, J.L., S. Jain and Nitin Jain. 2008. *Fundamentals of Biochemistry*. S. Chand & Company Ltd., New Delhi.
3. Pandey, B. P. 2007. *Botany for Degree Students: Plant Physiology, Biochemistry, Biotechnology, Ecology and Utilization of Plants.* S. Chand & Company Ltd., New Delhi.
4. Salisbury, F. B. and C. W. Ross. 1992. *Plant Physiology. 4th edn. (India Edition*), Wordsworth, Thomson Learning Inc., USA. Taiz, L. and E. Zeiger. 1998.
5. *Plant Physiology (2nd Ed.).* Sinauer Associates, Inc., Publishers, Massachusetts, USA.
6. G. Ray Noggle & George. J. Fritz, 1982. *Introductory Plant Physiology*. Prentice Hall of India Pvt. Ltd., New Delhi.
7. V. Verma, 2008.*Textbook of Plant Physiology*. Ane Books India, New Delhi.

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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 needs	The concepts of plant physiology and metabolism serve as foundational pillars for addressing the diverse agricultural and environmental needs in relation to crop production.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	**Syllabus Content**	**Description of Activity**
SD	Module I- Plant water relations and Mineral Nutrition	• Implementing the technique of hydroponics for farming
	Module IV Plant growth and Development	• The study of physiological processes determines plant growth, development, and economic production. • The study of phytohormones helps in understanding the technique for improvement of crop production and the quality of food.

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7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Participative Learning	• Information collection from Library • Teams of three or four to discuss on Stress tolerance, Growth and development • Mineral Nutrition, Live experiments conducted compilation and presentation
2.	Experiential Learning	• Live experiments like Four leaf experiment for transpiration, Effects of different wavelengths of light for photosynthesis etc. • Interactive Class room games/Quiz through Kahoot.
3.	Problem solving	• Research Projects • Reviewing research articles.

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

PLANT PHYSIOLOGY & METABOLISM

Course Code: U24/ BOT/ DSE/501
TIME: 2 Hours **MAXMARKS: 60**

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)

I. Answer All questions: **Marks: 4 x 10 - 40**

1. List different theories associated with stomatal mechanisms.
   OR
2. Explain the concept of water potential.

3. Describe in detail the Hatch Slack cycle.
   OR
4. Explain the mechanism of enzyme action and factors affecting enzyme action.

5. Elaborate in detail the Biological N_2 fixation.
   OR
6. Elaborate in detail the Kreb's cycle.

7. Describe in detail about Auxins.
   OR
8. What is Photoperiodism? Describe the physiology of flowering.

Section-B (Short Essay Type)

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

9. Explain Osmotic potential
10. Define Pigment system and its function
11. Outline the process of Fermentation
12. What is Phytochrome? Explain its function.
13. Discuss GOGAT
14. Inspect the role of Gibberellins in plant growth.

Basanti. d
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Sushama

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PLANT PHYSIOLOGY & METABOLISM

SECTION A - INTERNAL CHOICE				4Q X 10 M = 40 M
Question Number	Question	Question	CO	BTL (Blooms Taxonomy Level)
1	Module 1	List different theories associated with stomatal mechanisms.	CO 1	Level I, IV
2	Module 1	Explain the concept of water potential.	CO 1	Level II
3	Module 2	Describe in detail the Hatch Slack cycle.	CO 2	Level I, II
4	Module 2	Explain the mechanism of enzyme action and factors affecting enzyme action.	CO 2	Level II
5	Module 3	Elaborate in detail the Biological N_2 fixation	CO 3	Level VI
6	Module 3	Elaborate in detail the Kreb's cycle.	CO 3	Level VI
7	Module 4	Describe in detail about Auxins.	CO 4	Level I, II
8	Module 4	What is Photoperiodism? Describe the physiology of flowering.	CO 4	Level I, 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	Explain Osmotic potential	CO 1	Level I, II
10	Module 2	Define Pigment system and its function	CO 2	Level I
11	Module 3	Outline the process of Fermentation	CO 3	Level II
12	Module 4	What is Phytochrome? Explain its function.	CO 4	Level I, II
13	Module 3	Discuss GOGAT	CO 3	Level II
14	Module 4	Inspect the role of Gibberellins in plant growth	CO 4	Level IV

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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	CO 1	2	10 each	1	5
2	17	CO 2	2	10	1	5
3	16	CO 3	2	10	1	5
4	12	CO 4	2	10	1	5

9. CO-PO Mapping

CO	PO	Cognitive Level	Classroom sessions (hrs)
1	1-7	Understanding	15
2	1,2,5,6	Applying	17
3	1,5,6	Analyzing	16
4	1,4,5,6	Understanding	12

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PLANT PHYSIOLOGY & METABOLISM

Practical Syllabus

1. Course Description

Programme:	**B. Sc**	**Max. Hours:**	**30**
Course Code:	**U24/ BOT/ DSE/501/P**	**Hours per week:**	**2**
Type of Course:	**DSE - 1**	**Max. Marks:**	**50**
No. of Credits:	**1**		

2. Course Objectives

1. To identify parameters that reflect the physiological status and metabolic activities of plants under different environmental conditions.
2. To interpret various physiological processes through some demonstration experiments.

3. Course Outcomes

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

CO1: Describe the basic physiological aspects in plants by performing experiments
CO2: Devise methods to improve basic skills and techniques related to plant physiology
CO3: Assess the methods used in the separation and estimation of plant components.
CO4: Demonstrate the various physiological processes in plants

4. Course Content

1. Determination of osmotic potential of vacuolar sap by Plasmolytic method using leaves of *Rheo discolor / Tradescantia*
2. Determination of rate of transpiration using cobalt chloride method
3. Determination of stomatal frequency using leaf epidermal peelings / impressions
4. Study of mineral deficiency symptoms using plant material / photographs
5. Determination of catalase activity using potato tubers by titration method
6. Separation of chloroplast pigments using paper chromatography technique
7. Estimation of protein by Biuret method
8. Identification of C_3, C_4 and CAM plants

Demonstration experiments

1. Potato osmoscope
2. Growing plants in Hydroponic system
3. Evolution of CO_2 in aerobic respiration by direct current method
4. Effect of temperature on membrane permeability (Beet root)
5. Demonstrate that CO_2 is necessary for photosynthesis
6. Phototropism in open field

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5. Model Question Paper – End Semester Exam Practical

PLANT PHYSIOLOGY & METABOLISM

Course Code: U24/ BOT/ DSE/501/P

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

Q I. Conduct the Major physiology experiment allotted to you **'A'.** Give the procedure, results and inference.

(Procedure – 3, experimentation – 3, observation –2, inference – 2) **10 Marks**

Q II. Identify the Minor physiology experiment allotted to you **'B'.** Give the procedure, results and inference. **5 Marks**

Q III. Identify the Mineral deficiency and comment on 'C', 'D' and 'E' **5x3-15 Marks**

Q IV. Project. **10 Marks**

Q V. Viva-Voce **5 Marks**

Q VI. Record **5 Marks**

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SEMESTER V

SEED TECHNOLOGY

1. Course Description

Program:	**B. Sc**	**Max. Hours:**	**60**
Course Code:	**U24/ BOT/ DSE/502**	**Hours per week:**	**4**
Type of Course:	**DSE-2**	**Max. Marks:**	**60**
No. of Credits:	**4**		

2. Course Objectives

1. Discuss the methods involved in production of quality seed including testing and certification.
2. Develop and strengthen the seed technology research.

3. Course Outcomes

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

CO1: Explain seed structure and related characteristics of seed dormancy and viability
CO2: Illustrate various plant harvesting methods
CO3: Explain the types of pollination and production of hybrid seeds
CO4: Describe seed testing technology and role of seed banks

4. Course Content

Module I: Seed Viability **15 hours**

1.1. Seed: Germination, factors initiating seed germination, mulching, seed structure and types. Seed dormancy: causes and methods of breaking dormancy.
1.2. Seed viability, factors affecting seed viability and genetic erosion.
1.3. Seed storage: long term and short-term storage. Orthodox and recalcitrant seeds. Packing of seeds – Principles, practices, bagging and labelling; Physico and Bio-chemical changes during seed storage.

Module II: Seed Harvest **15 hours**

2.1. Cultural practices and harvesting of Seed: Isolation, Sowing, Cultural practices, (Fertigation, Irrigation, plant protection), Rouging, Harvesting and threshing of the following crops.
   a. Maize
   b. Rice
   c. Cotton
   d. Sunflower
   e. Groundnut

2.2. Seed Treatment to control seed borne disease – General account.

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Module III: Hybrid seed production **15 hours**

3.1. Structure of pollen and ovule-Types of ovules, Collection and storage of pollen.
3.2. Principles of hybrid seed production-Cross pollination, Emasculation, Self-pollination, role of pollinators and their management
3.3. Seed development in cultivated plants, seed quality concept, importance of genetic purity of seed. Hybrid seed production and Heterosis.

Module IV: Seed Testing **15 hours**

4.1. Seed production technology; seed testing- Procedures of seed testing, seed testing laboratories and importance of seed testing
4.2. Seed certification- History, Seed certification agency, Indian minimum, general and specific seed certification standard.
4.3. Seed banks- National, International and Millennium seed banks.

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5. Reference Books

1. Agrawal, P. K. 1993. Hand Book of Seed Technology. Dept. of Agriculture and Cooperation. National Seed Corporation Ltd., New Delhi.
2. Balasubramanian, D., C. F. A. Bryce, K. Dharmalingam, J. Green and K. Jayaraman. 2004. Biotechnology. Universities Press (India) Private Limited, Hyderabad.
3. Bedell, Y. E. Seed Science and Technology. Indian Forest Species. Allied Publishers Limited. New Delhi.
4. Channarayappa. 2007. Molecular Biotechnology – Principles and Practices. Universities Press (India) Private Limited, Hyderabad. Chawala, H. S. 2002.
5. Introduction to Plant Biotechnology. Oxford & IBH Publishing Company, New Delhi.
6. Dubey, R. C. 2001. A Textbook of Biotechnology. S. Chand & Company Ltd., New Delhi.
7. Edmond, J. B., T. L. Senn, F. S. Adrews and R. J. Halfacre. 1977.
8. Hartman, H. T. and D. E. Kestler. 1976. Plant Propagation: Principles and Practices. Prentice & Hall of India, New Delhi. Jha, T.B. and B. Ghosh. 2005. Plant Tissue Culture – Basic and Applied. Universities Press (India) Private Limited, Hyderabad.
9. Ramawat, K. G. 2008. Plant Biotechnology. S. Chand & Company Ltd., New Delhi.
10. Salisbury, F. B. and C. W. Ross. 1992. Plant Physiology. 4th edn. (India Edition), Wordsworth, Thomson Learning Inc., USA.
11. Tiwari, G. N. and R. K. Goal. Green House Technology – Fundamentals, Design, Modelling and Application. Narosa Publishing House, New Delhi.
12. Tunwar, N. S. and S. V. Singh. 1988. Indian Minimum Seed Certification Standards. The Central Seed Certification Board, Govt. of India, New Delhi.

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6. Syllabus Focus

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

Local /Regional/National /Global Development Needs (Mention any ONE at a time)	**Relevance** (Describe how the course addresses the need) Maximum 15 words
National needs	Seed technology gives the understanding about the quality seeds, through certified seed facility enabling modern agricultural practices like climate smart agriculture and mitigating climate change impacts

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP (Mention any ONE of the above at a time)	**Syllabus Content** (Mention Module No. or part content applicable)	**Description of Activity** (Activity that will be conducted in class to support the focus of SD/ED/EMP in the syllabus content)
SD	Module II	Students can understand the betterment about the Seed harvest technology
	Module IV	Students can able to develop the skills in the seed testing methodologies

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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	• Performing minor experiments to check the seed quality (viability). • Field Trips to seed testing & certification laboratories.
3.	Problem solving	• Research Projects • Reviewing research articles on seed technology

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 / Assignment	

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b) Model Question Paper – End Semester Exam Theory

SEED TECHNOLOGY

Course Code: U24/ BOT/ DSE/502 **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)

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

1. List the causes and methods of breaking of seed dormancy.

OR

2. Elaborate on biochemical changes that occur during seed storage.

3. Describe the culture practices and harvesting of maize.

OR

4. Explain general account on seed treatment to control seed-borne diseases.

5. List the various principals of hybrid seed production.

OR

6. Describe the various methods of collection and storage of pollen.

7. Assess the procedures for seed testing and add a note on its importance.

OR

8. What is seed certification? Explain the Indian seed certification standards.

Section B (Short Essay Type)

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

9. What is Seed viability?
10. List in brief the cultural practices of Sunflower cultivation
11. Define Heterosis in detail
12. Discover the role of National Seed Bank
13. Compare Orthodox and Recalcitrant seeds.
14. Describe the Role of pollinators.

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SECTION A - INTERNAL CHOICE				4Q X 10 M = 40 M
Question Number	Question	Question	CO	BTL (Blooms Taxonomy Level)
1	Module 1	List the causes and methods of breaking of seed dormancy.	CO 1	Level I, IV
2	Module 1	Elaborate on biochemical changes that occur during seed storage.	CO 1	Level VI
3	Module 2	Describe the culture practices and harvesting of maize.	CO 2	Level I, II
4	Module 2	Explain general account on seed treatment to control seed-borne diseases.	CO 2	Level II
5	Module 3	List the various principals of hybrid seed production.	CO 3	Level I, IV
6	Module 3	Describe the various methods of collection and storage of pollen.	CO 3	Level I, II
7	Module 4	Assess the procedures for seed testing and add a note on its importance.	CO 4	Level V
8	Module 4	What is seed certification? Explain the Indian seed certification standards.	CO 4	Level I, 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 Seed viability?	CO 1	Level I
10	Module 2	List in brief the cultural practices of Sunflower cultivation	CO 2	Level I, IV
11	Module 3	Define Heterosis in detail	CO 3	Level I
12	Module 4	Discover the role of National Seed Bank	CO 4	Level IV
13	Module 1	Compare Orthodox and Recalcitrant seeds.	CO 1	Level IV
14	Module 3	Describe the Role of pollinators.	CO 3	Level I, 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	15	CO 1	2	10 each	1	5
2	15	CO 2	2	10	1	5
3	15	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, 6	Understanding	15
2	1, 5, 6	Applying	15
3	1, 5, 6	Understanding	15
4	1, 5, 6	Understanding	15

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SEED TECHNOLOGY

Practical Syllabus

1. Course Description

Programme:	**B. Sc**	**Max. Hours:**	**30**
Course Code:	**U24/ BOT/ DSE/502**	**Hours per week:**	**2**
Type of Course:	**DSE - 2**	**Max. Marks:**	**50**
No. of Credits:	**1**		

2. Course Objectives

1. To test the seed quality by following some experimental procedures.
2. To describe the method of hybrid seed production along with basic knowledge of palynology and embryology.

3. Course Outcomes

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

CO 1: Examine the seed quality & viability by using experimental methods
CO 2: Demonstrate the concept of seed dressing using biofertilizers and fungicides.
CO 3: demonstrate the experiments related to palynology and embryology.

4. Course Content

Major Experiments

1. Testing of seed viability using 2,3,5-triphenyl tetrazolium chloride (TTC)
2. Estimation of amylase activity of germinating seeds (Qualitative)
3. Demonstration of seed dressing of using fungicides to control plant diseases.
4. Demonstration of seed dressing using Biofertilizers (BGA) to each nutrient supply

Minor Experiments

1. Emasculation, bagging of flower for hybrid seed production.
2. Dissection of Dicot embryo (bean) and Monocot embryo (maize).
3. Pollen viability test using Evan's blue staining. (*Hibiscus*).
4. Harvesting and Importance of following seeds: Rice, Maize, Cotton, Groundnut and sunflower.
5. Types of ovules: Orthotropous, Anatropous and campylotropous.
6. Structure of pollen grains: Hibiscus and grass
7. Study visits to research institutes, seed tests and certification laboratories and places seed banks.

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5. Model Question Paper – End Semester Exam Practical

SEED TECHNOLOGY

Course Code: U24/ BOT/ DSE/502/P

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

Q I. Conduct the experiment allotted to you **'A'**. Give the procedure, results and inference. Scheme for valuation: (Procedure – 2, experimentation – 4, observation – 2, inference – 2)
10 Marks

Q II. Describe the procedure for the experiment **'B'**. Give the procedure, results and inference. Scheme for valuation: (Procedure – 2, experimentation – 2, observation & inference – 1)
5 Marks

Q III. Identify, classify giving reasons with suitable diagrams of the given specimens **E, F, G, H, I, J.** Scheme for valuation: Identification-1 mark; Notes mark for each spotter.
5 x 3 – 15 Marks

Q IV. Project. **10 Marks**

Q V. Viva-voce **5 Marks**
Q VI. Record **5 Marks**

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