SEMESTER – VI
ENTREPRENEURSHIP DEVELOPMENT-THEORY

1. Course Description:

Programme: B.Sc.
Course Code: U24/MIC/DSE/601
Course Type: DSE
No. of credits: 4

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

2. Course Objectives:

- To learn about the entrepreneurial skills and how to mould to be successful entrepreneur.
- To acquire knowledge on sources for business ideas, project report preparation, marketing strategies

3. Course Outcomes:

CO1: Understand the Concept of entrepreneurship and to be successful entrepreneur. (LI),(LIV)

CO2: Generate, analyze and evaluate new business ideas and apply to initiate a startup (LIV)

CO3: Prepare and evaluate detailed project report. (LV)

CO4: Enhance creativity and mould them to become women entrepreneurers using the knowledge gained in life sciences to start synthesis of commercial products. (LVI)

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4. Course Content:

MODULE I - ENTREPRENEUR AND ENTREPRENEURSHIP: **(15 Hrs)**

Introduction, the Concept of Entrepreneur, Characteristics of an Entrepreneur, Distinction between an Entrepreneur and a Manager, Functions of an Entrepreneur. Types of Entrepreneur, Concept of Entrepreneurship. Nature and Characteristics of Entrepreneurship. Scope of Entrepreneurship. Factors affecting Entrepreneurial growth. Introduction to Motivation.

MODULE II - BUSINESS IDEA : **(15 Hrs)**

Introduction, New Business ideas. Sources of Business ideas, Preliminary research, Business Idea Evaluation, Case studies.

MODULE III - IDENTIFICATION OF BUSINESS OPPORTUNITIES: **(15 Hrs)**

Market Survey; Introduction, Meaning and Definition of Project, Formulation of Detailed Project Report (DPR) and conceptual knowledge of process flow for registration and incorporation of a company and funding opportunities.

MODULE IV- SELECTION OF PRODUCT: **(15 Hrs)**

Criteria for selecting a product, Barriers to the successful development of new products. Choice of technology, plant and equipment. Financial assistance by various functional institutions to industries. Importance of small scale industries producers in setting up of small scale units. Women entrepreneurship Case studies : Mushroom, Cultivation, Vermicomposting, Biofertilizer production, Synthesis of Commercial products Business analysis.

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5. Resources:

Text books / Reference Books:

1. Entrepreneurship development –Rajeev Roy
2. Natural entrepreneurship network.
3. Project Management- Vasanth Desai
4. Management of small Business- Vasanth Desai
5. Entrepreneurship Development- S. Anil Kumar

6. Syllabus Focus

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

Local/Regional/National /Global Development Needs	Relevance
Global needs	It holds Global needs as Synthesis of Commercial products can greatly benefit from entrepreneurship since it helps them connect with customers all over the world.

a. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
ED	MODULE IV	To facilitate the learning process, the students would be given an opportunity to develop innovative product during practical sessions.

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7. Pedagogy:

S. No	Student Centric Methods Adopted	Type/Description of Activity
1	Field trips	Experiential learning
2	Practical presentations	Participative learning
3	Workshops	Participative learning
4	Case studies	Problem solving

8. Course Assessment Plan:

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

Cos	Continuous Internal Assessments- CIA (40%)	End Semester Examination (60%)
CO1	CIA-1	End Semester examination
CO2	CIA-1	
CO3	CIA-2 Product presentation	
CO4	CIA-2 Assignment/ Case studies	

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b) Question Paper Pattern:

ENTREPRENEURSHIP DEVELOPMENT-THEORY

Course Code: U24/MIC/DSE/601 **Max Marks: 60**
Credits: 4 **Time: 2 Hrs**

SECTION – A

I. Answer the following **4 x 10 = 40 M**

1. Describe the common characteristics of successful entrepreneurs.

OR

2. Analyze the different factors affecting entrepreneurial growth.

3. What ideas justify the new and different sources of Business ideas?

OR

4. How can you identify the major criteria by which business ideas can be evaluated explain in detail?

5. Evaluate the criteria for preparation of a detailed project report.

OR

6. Determine the advantages of incorporation of a company and funding opportunities for companies.

7. Estimate the barriers to new product development and challenges associated with creating a successful new product.

OR

8. Develop the important parameters to start a small scale industry and the advantages of it.

SECTION – B

II. Answer any FOUR **4x 5 = 20 M**

9. Define Entrepreneur.
10. What is Motivation?
11. List out Preliminary research.
12. How would you assess the importance of Project Report.
13. What is your opinion on Business analysis?
14. Compile the list of Funding agencies.

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SECTION A - INTERNAL CHOICE			4Q X 10 M = 40 M	
Question Number	**Module**	**Question**	**CO**	**BTL (Blooms Taxonomy Level)**
1	Module 1	Describe the common characteristics of successful entrepreneurs.	CO 1	Level I
2	Module 1	Analyze the different factors affecting entrepreneurial growth.	CO 1	Level IV
3	Module 2	What ideas justify the new and different sources of Business ideas?	CO 2	Level , IV
4	Module 2	How can you identify the major criteria by which business ideas can be evaluated explain in detail?	CO 2	Level IV
5	Module 3	Evaluate the criteria for preparation of a detailed project report.	CO 3	Level V
6	Module 3	Determine the advantages of incorporation of a company and funding opportunities for companies.	CO 3	Level V
7	Module 4	Estimate the barriers to new product development and challenges associated with creating a successful new product?	CO 4	Level VI
8	Module 4	Develop the important parameters to start a small scale industry and the advantages of it.	CO 4	Level VI
SECTION B - ANSWER ANY 4 OUT OF 6 (To compulsorily have **ONE** question from **each** module)			4 Q X 5M = 20M	
9	Module 1	Define Entrepreneur.	CO 1	Level I
10	Module 1	What is Motivation ?	CO 1	Level I
11	Module 2	List out Preliminary research	CO 2	Level IV
12	Module 3	How would you assess the importance of Project Report?	CO 3	Level V
13	Module 3	What is your opinion on Business analysis?	CO 3	Level V
14	Module 4	Compile the list of Funding agencies.	CO 4	Level VI

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SEMESTER – IV

ENTREPRENEURSHIP DEVELOPMENT- PRACTICAL

1. Course Description:

Course Code: U24/MIC/DSE/601/P **Max. Hours: 30**
Course Type: DSE **Hours per week: 2**
No. of Credits: 1 **Max. Marks: 50**

2. Course Objectives:

To motivate and develop entrepreneurial skills to initiate startups in life sciences.

3. Course Outcomes:

CO1: Carryout Vermi composting and Biofertilizer production giving rise to initiate startup.

CO3: Production of dairy, semi processed fermented food products of commercial importance

List of Practicals

1. Mushroom Cultivation
2. Vermi composting
3. Biofertilizer production
4. Synthesis of enzymes, organic acids and Commercial products
5. Production of dairy products of commercial importance.
6. Production of semi processed Fermented food of commercial importance.
7. Four field visits to industrial production site.

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MODEL QUESTION PAPER – PRACTICAL

Course Code: U24/MIC/DSE/601/P **Max.Marks:50**

No. of credits: 1 **Time: 2Hrs**

I. **Major:** Prepare the culture medium for isolation of spawn and make the slants. Write the protocol for Mushroom cultivation. **20 M**

II. **Minor:** Isolate and identify bacteria from the given semi processed Fermented food **10M**

III. Identify the given spots (A-E) and write few significant points **5 x 2 = 10 M**

IV Record **5 M**

V Viva **5 M**

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

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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 -VI
EXPERIMENTS IN PHYSICAL CHEMISTRY II AND INSTRUMENTATION

Program: B.Sc.
Course Code: U20/CHE/DSE/601/P
Course: DSE-3&4
No. of Credits : 1

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

Course Objectives

- To equip the students with skills to determine various physical parameters using instrumentation methods and to synthesize complexes.

Course Outcomes

CO1: Achieve the expertise in determining pH, conductivity, unknown concentration of solutions and rate constants of reactions.
CO2: Acquire the ability to synthesize metal complexes.

Chemical Kinetics:

1. Catalytic Decomposition of Hydrogen Peroxide.
2. Acid catalyzed hydrolysis of methyl acetate.
3. Kinetic study of oxidation of I^- by $K_2S_2O_8$.

Colorimetry:

4. Determination of Dichromate and Permanganate in a mixture using Beer Lambert's Law.
5. Job's Method for the determination of ferric thiocyanate complex.

pH metry:

6. Titration of strong acid Vs strong base.
7. Determination of ionization constant of acetic acid by pH metric method.

Preparation of Complexes:

8. To prepare a complex of tetraammine copper II sulphate complex.
9. To prepare a complex of chloropentaamminecobalt III chloride.
10. To prepare a complex of hexammine nickel II chloride.

References

1. Khosla, B. D.; Garg, V. C. & Gulati, A. *Senior Practical Physical Chemistry*, R. Chand & Co.: New Delhi (2011).
2. Svehla, G, *Vogel's Qualitative Inorganic Analysis:* Pearson Education, 2012.
3. Mendham, J, *Vogel's Quantitative Chemical Analysis:* Pearson, 2009.

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6. **Syllabus Focus**

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

Local /Regional/National /Global Development Needs	Relevance
Local	Knowledge of chemistry of complexes helps in everyday life
Regional	Learning the concepts of surface chemistry and pericyclic reactions changes their perspective towards various processes
National	Through Knowledge of spectral interpretation opens new horizons in skill development and employability
Global	A complete idea of complexes and spectral interpretation increases students inclination towards research

b. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD EMP	Module 1 synthesis of complexes	Some complexes are synthesized in the Lab.Many metal complexes are widely used in the pharmaceutical companies.This enhances their skill development and employability.
SD	Module 3 Spectral interpretation	Students are taught the instrumentation of all the spectroscopic methods, they are taken to various research labs to show live instrumentation techniques. They are thoroughly trained in spectral interpretation by giving assignments.

7. **Pedagogy**

S. No.	Student Centric Methods Adopted	Type / Description of Activity
1.	Field trips	Students are taken to various institutes like IICT, HCU, IIT , ARCI etc
2.	Role play	Students are made to enact various concepts of chemistry
3.	Seminars/ workshops/ research projects	Students are allowed to participate in seminars and workshops organized in and

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		outside the college. They are encouraged to take up research projects.

8. Course Assessment Plan

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

CO	Continuous Internal Assessments CIA - 50%	End Semester Examination-50%
CO1	CIA 1 written exam (10 M)	Written Exam
CO2	Skill Test 1 (10 M)	
CO3	CIA 1 written exam (10 M)	
CO4	Skill Test 2 (10 M)	

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b. Model Question Paper - End Semester Exam

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

TIME: 2hrs **Course Code: U24/CHE/DSE/601**
Max. Marks: 50

SECTION –A (Essay Questions)

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

1. a) Describe the structure of $[Cu(NH_3)_4]$ using Valence bond theory. (CO1) **L1** 5M
   b) Define optical isomerism? Draw and explain the optical isomerism in octahedral complexes. (CO1) **L1** 5M

OR

2. a) Summarise Werner's theory with examples. (CO1) **L2** 5M
   b) Explain the Crystal field splitting in octahedral complexes. (CO1) **L5** 5M
3. Outline the mechanism of SN^1 in the octahedral and SN^2 in square planar complexes with one example each. (CO2) **L2** 10 M

OR

4. a) Define trans effect? Discuss the theories and applications of trans effect. (CO2) **L2** 5M
   b) Distinguish labile and inert complexes? Explain with examples. (CO2) **L4** 5M
5. a) What is the chemical shift? Explain the change in position of signals with examples. (CO3) **L1** 5M
   b) Elaborate about (M+1), (M+2) and base peaks with two examples in Mass spectrometry. (CO3) **L6** 5M

OR

6. a) Indicate the number of signals possible for CH_3-CH_2-CH_2-OH and explain spin- spin splitting. (CO3) **L6** 5M
   b) Explain the basic principles of ESR spectroscopy. (CO3) **L5** 5M
7. a) Classify the various types of colloids? (CO4) **L5** 5M
   b) Deduce the expression for Langmuir adsorption isotherms. (CO4) **L5** 5M

OR

8. What are Flourescence and Phosphorescence ? Explain the phenomenon of florescence and phosphorescence using Jablonski diagram. 10M

SECTION – B (Short answer questions)

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

9. Explain the Job's method of determination of composition of a complex. **(L2)**
10. What is EAN? Calculate the EAN for [Co(NH3)6] and [FeF6]3- **(L1)**
11. Describe the acid hydrolysis of octahedral complexes. **(L2)**
12. Define Hardy Schulze rule and Gold number. **(L1)**
13. Show how the molecular formula of a compound is determined based on its Mass spectrum? **(L1)**
14. Discuss the quantum yield for the photochemical combination of H_2& Cl_2 to form HCl **(L5)**

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11. Describe the acid hydrolysis of octahedral complexes. **(L2)**
12. Define Hardy Schulze rule and Gold number. **(L1)**
13. Show how the molecular formula of a compound is determined based on its Mass spectrum? **(L1)**
14. List out the various types of NMR signals expected for 1,1,2-tribromoethane? What is the intensity ratio of the peaks? **(L1)**

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	20
2	15	2	2	10	1	15
3	15	3	2	10	2	20
4	15	4	2	10	1	15

9. 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
Madhuri	D. Sumalatha	
Name and Signature of the teaching faculty Y. Lakshmi madhuri	Name and Signature of the HoD Dr. D.Sumalatha	Name and Signature of Principal Dr. Uma Joseph

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b. Model Question Paper - End Semester Exam

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(An Autonomous College Affiliated to Osmania University)

Faculty of Science – Department of Chemistry

B.SC. III YEAR SEMESTER -VI

ADVANCED CHEMISTRY

TIME: 2hrs **Course Code: U24/CHE/DSE/601**

Max. Marks: 50 **Credits: 4**

SECTION A - INTERNAL CHOICE		4 X 10 M = 40M		
Question Number	**Question**		**CO**	**BTL**
1	Module 1	(a) Describe the structure of [Cu(NH3)4] using Valence bond theory. 5M (b) Define optical isomerism? Draw and explain the optical isomerism in octahedral complexes. **OR**	CO1	Level 1
2	Module 1	(a) Summarise Werner's theory with examples. (b) Explain the Crystal field splitting in octahedral complexes.	CO1	Level I
3	Module 2	Outline the mechanism of SN^1 in the octahedral and SN^2 in square planar complexes with one example each. 10 M **OR**	CO2	Level 2
4	Module 2	(a) Define the trans effect? Discuss the theories and applications of trans effect. (L1) 5M (b) Distinguish labile and inert complexes? Explain with examples. (L4) 5M	CO2	Level 2
5	Module 3	(a) What is the chemical shift? Explain the change in position of signals with examples. 5M (b) Elaborate about (M+1), (M+2) and base peaks with two examples in Mass spectrometry 5M **OR**	CO3	Level 1
6	Module 3	(a) Develop the number of signals possible for CH_3-CH_2-CH_2-OH and explain spin- spin splitting. 5M (b) Explain the basic principles of ESR spectroscopy.	CO3	Level 5 & 6
7	Module 4	(a) Classify the various types of colloids? 5M (b) Deduce the expression for Langmuir adsorption isotherms. 5M **OR**	CO4	Level 5
8	Module 4	What are Flourescence and Phosphorescence ? Explain the phenomenon of florescence and phosphorescence using Jablonski diagram.	CO4	Level 2

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SECTION B – (Short answer questions) ANSWER ANY 4 OUT OF 6			4 X 5M = 20 M	
9	Module 1	9. Explain the Job's method of determination of composition of a complex.	CO1	Level 2
10	Module 2	10.What is EAN ? Calculate the EAN for [Co(NH3)6] and [Fe6]3-	CO1	Level 1
11	Module 3	11. Describe the acid hydrolysis of octahedral complexes.	CO2	Level 2
12	Module 4	12. Define Hardy Schulze rule and Gold number	CO4	Level 1
13	Module 2	13. Show how the molecular formula of a compound is determined based on its Mass spectrum? (L1)	CO3	Level 1
14	Module 3	14. Discuss the quantum yield for the photochemical combination of H_2& Cl_2 to form HCl	CO4	Level 5

SEMESTER - VI

FOOD & DAIRY MICROBIOLOGY

1. Course Description:

Programme: B.Sc.
Course Code: U24/MIC/DSE/602
Course Type: DSE
No. of credits:4

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

2. Course Objectives:

- To help students understand the current trends and concepts related to Microbiology of food and other dairy products.
- To give insights into various types of food borne diseases and their prevention.

3. Course Outcomes:

CO1: Understand the significance and activities of microorganisms in food the role of Intrinsic and extrinsic factors on growth and survival of microorganisms and attain information on microbial food spoilage. (LII)

CO2: Understand the principles in traditional food preservation techniques including salting, pickling, refrigeration, freezing, oxidation, and canning/bottling and chemical preservation. (LII)

CO3: Analyze types of starter cultures like Lactic acid bacteria, fermented milk products, probiotics, SCP and Edible mushrooms. (LI V)

CO4: Understand the microbes causing food intoxications and food infections.(LII)

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4. Course Content:

MODULE I- INTRODUCTION TO FOOD AND DAIRY MICROBIOLOGY: (15 Hrs)

Importance of studying food and dairy microbiology. Natural flora and Sources of contamination of foods in general. Classification of food in relation to shelf life, Microbial spoilage: principles, intrinsic and extrinsic factors that affect growth and survival of microbes in foods, Spoilage of vegetables, fruits, meat, eggs, canned foods.

MODULE II- PRINCIPLES AND METHODS OF FOOD PRESERVATION: (15 Hrs)

Principles, physical methods of food preservation: temperature, Pasteurization, types(canning, drying); High pressure and Irradiation.

Chemical methods of food preservation: salt, sugar, organic acids, SO2 and antibiotics.

MODULE III-FERMENTED FOODS : (15 Hrs)

Microbiology of fermented milk - Starter lactic cultures,

fermented milk products: yogurt, butter and cheese,

other fermented foods: idly, bread.

Nutritional value of fermented foods.

Microorganisms as food: single cell protein, edible mushrooms.

Probiotics: definition and uses.

MODULE IV- FOOD BORNE DISEASES : (15 Hrs)

Definition of food poisoning, food infections and toxications.

Causative agents, foods involved, symptoms and preventive measures.

Food intoxications: *Staphylococcus aureus, Clostridium botulinum* and mycotoxins.

Food infections: *Bacillus cereus, Escherichia coli, Shigella, Listeria monocytogenes*.

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5. References:

Text Books:

1. Frazier WC and West off DC. (1988) Food microbiology, TATA McGraw Hill Publishing Company Ltd. New Delhi.
2. Adams MR and Moss MO. (1995). Food Microbiology, The Royal Society of Chemistry, Cambridge.
3. Biotechnology by R.C.Dubey,S. Chand publishers.

Reference Books:

1. Adams MR and Moss MO. (1995). Food Microbiology, The Royal Society of Chemistry, Cambridge.
2. Alexander M. (1977) Introduction to soil microbiology. John Wiley & Sons, Inc., New York.
3. Andrews AT, Varley J. (1994) Biochemistry of milk products. Royal Society of Chemistry.
4. Banwart GJ. (1989), Basic food microbiology, Chapman & Hall, New York.
5. EcEldowney S, Hardman DJ, Waite DJ, Waite S. (1993). Pollution: Ecology and Biotreatment – Longman Scientific Technical.
6. Frazier WC and Westhoff DC. (1988) Food microbiology, TATA McGraw Hill Publishing Company Ltd. New Delhi.
7. Jay JM, Loessner MJ and Golden DA. (2005). Modern Food Microbiology. 7th edition, CBS Publishers and Distributors, Delhi, India.
8. Gopal Reddy et al, Laboratory experiments in Microbiology.
9. Prescott, Harley and Klein Wim. Microbiology, C.Brown Publishers.
10. R.C Dubey, D.K Maheshwari, Practical Microbiology, S Chand and Company, New Delhi.
11. Cappuccino, Sherman, Microbiology Laboratory Manual, Pearson Education.

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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	Explore global advancements in food and dairy microbiology for sustainable development and safety assurance.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
ED	Module III	Activity on different Fermented foods will be conducted in the class.

7. Pedagogy:

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Field Trips	Experiential Learning
2.	Group Discussion	Participative Learning
3.	Science Experiments	Experimental 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 Exam	Written Exam
CO2	CIA-1- Written Exam	
CO3	CIA-2 Presentation	
CO4	CIA 2- Assignment	

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b) MODEL QUESTION PAPER - END SEMESTER EXAM

FOOD & DAIRY MICROBIOLOGY

Course Code: U24/MIC/DSE/602

Credits:4

Max Marks: 60

Time: 2 Hrs

SECTION – A

Answer the following **4 x 10 = 40 M**

1. Explain the natural flora and sources of contamination of foods in general.

OR

2. Explain in detail the intrinsic and extrinsic factors of microbial spoilage of food.

3. Describe in detail about the physical methods of food preservation.

OR

4. Evaluate the role of natural and synthetic antimicrobial compounds in preserving vegetables and preventing spoilage.

5. Describe the microbiology aspects of fermented milk and milk products.

OR

6. Summarize on distinguished nutritional values of fermented foods. Describe the microbiology aspects of fermented milk and milk products.

7. Define and add a detailed note about food intoxication with examples.

OR

8. List food borne infections and elaborate by stating examples.

SECTION – B

Answer any FOUR **4 x 5 = 20 M**

9. Describe about Canned foods.
10. Explain Pasteurisation .
11. Explain about Probiotics.
12. Explain Symptoms and preventive measures of food poisoning.
13. Describe about Irradiation.
14. What are Mycotoxins?

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SECTION A - INTERNAL CHOICE				4 Q X 10 M = 40 M
Question Number	**Module**	**Question**	**CO**	**BTL(Blooms Taxonomy Level)**
1	Module 1	Explain the natural flora and sources of contamination of foods in general.	CO 1	Level II
2	Module 1	Explain in detail the intrinsic and extrinsic factors of microbial spoilage of food	CO 1	Level II
3	Module 2	Describe in detail about the physical methods of food preservation	CO 2	Level I
4	Module 2	Evaluate the role of natural and synthetic antimicrobial compounds in preserving vegetables and preventing spoilage.	CO 2	Level V
5	Module 3	Describe the microbiology aspects of fermented milk and milk products.	CO 3	Level I
6	Module 3	Summarize on distinguished nutritional values of fermented foods. Describe the microbiology aspects of fermented milk and milk products.	CO 3	Level II
7	Module 4	Define and add a detailed note about food intoxication with examples.	CO 4	Level I
8	Module 4	List food borne infections and elaborate by stating examples.	CO 4	Level I
SECTION B - ANSWER ANY 4 OUT OF 6 (To compulsorily have **ONE** question from **each** module)				4 Q X 5 M = 20 M
9	Module 1	Describe about Canned foods	CO 1	Level I
10	Module 2	Explain Pasteurisation .	CO 2	Level II
11	Module 3	Explain about Probiotics.	CO 3	Level II
12	Module 4	Explain Symptoms and preventive measures of food poisoning.	CO 4	Level II
13	Module 2	Describe about Irradiation.	CO 2	Level I
14	Module 3	What are Mycotoxins?	CO 3	Level I,II

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SEMESTER – VI
FOOD & DAIRY MICROBIOLOGY–PRACTICAL

Course Description:

Course Code: U24/MIC/DSE/602/P
Course Type: DSE
No. of credits: 1

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

Course Objectives:

- This course will help student learn various methods of isolation, detection and identification of spoilage microorganisms in food.
- Understand the application of principle of effect of temperature on spoilage of food products.

Course Outcomes:

CO1: Perform methods for isolation, detection and identification of microorganisms in milk.

CO2: Identify the spoilage microorganisms in fruits & vegetables, bread, mushrooms and analyze methods to control deterioration and spoilage.

CO3: Identify and analyze the microbes of canned foods.

CO4: Perform and analyze the effect of temperature on the spoilage of food products.

List of Practicals

1. MBRT of milk samples and their standard plate count.
2. Isolation of food borne bacteria from food products.
3. Isolation of food borne fungi from food products.
4. Isolation of spoilage microorganisms from bread.
5. Microbiological examination of canned foods.
6. Microbiological examination of mushrooms.
7. Isolation of spoilage bacteria from fruits and vegetables.
8. Effect of temperature on the spoilage of food products.
9. Milk testing by Resazurin dye.

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HEAD
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Hyderabad 500 007.

MODEL QUESTION PAPER - PRACTICAL

Subject Code: U24/MIC/DSE/602/P **Max.Marks:50**

Credits: 1 **Time: 2h**

I. MAJOR **20M**

1. Identify and enumerate the morphological characters of the colony in the given plate where the sample is spread from the spoiled bread. Interpret the results by Gram staining.

II. MINOR **10M**

1. Grade the quality of the given milk samples by MBRT and interpret the results.

OR

2. Examine the canned food provided and interpret the results

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

V. Record **5M**

VI. Viva **5M**

Prepared by Faculty	Checked &Verified by HoD	Approved by the Principal
Ms. K.Swathi	**Dr.P. Roselin**	**Dr.Uma Joseph**

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

HEAD
Department of Microbiology
Osmania University
Hyderabad 500 007.

SEMESTER –VI
SEC-IV MATERIAL SCIENCE AND CATALYSIS

1. Course Description

Programme: B.Sc.
Course Code: U24/CHE/SEC/601
2 Type of course: SEC
No. of credits: 2

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

2. Course Objectives:

- To provide students with a comprehensive understanding of catalysis at nanoscale with a focus on the unique properties.
- To equip students with application of catalysts including both homogeneous and heterogeneous types and their role in chemical processes and industries.

3. Course Outcome:

CO 1: Gain foundation in the principles of catalysis and apply at nanoscale.
CO 2: Identify and explain the mechanisms of catalytic reactions including the role of active sites and reaction pathways.

This SEC paper will help students to enhance their overall skills.

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Dept of Chemistry
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4. Course Content:

Module I: NANOMATERIALS AS CATALYSTS **15 Hrs**

Introduction: Nanocatalyst-A New Fangled material in the Catalytic World, Challenges to Nanocatalysts, Types of Nanocatalysis.Types of Nanocatalysts, Metal Nanoparticles as Catalysts, Metal Oxide Nanoparticles as Catalysts.

Carbon Family Nanomaterials as Nanocatalyst, other Nanomaterials as Nanocatalysts, Size and Shape, Effect of Nanoparticles on Catalytic Activity, Mechanism of Nanocatalysis

Green Nanocatalysis, Nanocatalysis and the Prospects of Green Chemistry, Some Examples of Nano Catalytic Green Reactions, Recoverability and Recycling of Nanocatalysts.

Applications of Nanocatalysts, nanocatalysts and multicomponent reactions.The concept of nanoreactor photocatalysis.

Module II: CATALYSIS **15 Hrs**

Introduction: Definition of a catalyst and catalysis. Homogeneous and heterogeneous catalysis- Comparison of homogeneous and heterogeneous catalysis with specific examples. General characteristics of catalytic reactions.

Acid-base catalysis- Examples of acid and base catalysed reactions- Hydrolysis of esters and Aldol condensation. Kinetics of acid catalysed reactions. Specific acid and general acid catalysis, Specific base and general base catalysis. Effect of pH on reaction rate of acid and base catalysed reactions.

Phase transfer catalysis: Principle of phase transfer catalysis, classification of phase transfer catalysts. Factors influencing the rate of PTC reactions.

Enzyme catalysis, Characteristics of enzyme catalysis, Examples: (i) Invertase in inversion of cane sugar (ii) Maltase in conversion of maltose to glucose (iii) Urease in decomposition of urea and (iv) Zymase in conversion of glucose to ethanol. Factors affecting enzyme catalysis. Effect of temperature, pH, concentration and inhibitor on enzyme catalysed reactions. Michaelis Menten equation.

5. References:

- T. Pradeep *Nano: The Essentials*, McGraw-Hill Education.
- CNR Rao et.al. *Chemistry of nanomaterials: Synthesis, Properties and applications,* Wiley-VCH Verlag GmbH & Co. KGaA.
- William D. Callister, Jr. John Wiley & Sons Materials Science and Engineering An Introduction.
- Nanotechnology: Principles and Practices by Sulabha K. Kulkarni
- Principles of Physical Chemistry by Puri, Sharma and Pathania, 2017.
- Text Book of Physical Chemistry P.L Soni, O.P Dharmaha, U.N Dash.
- Physical Chemistry by Atkins and De Paula, 8 th Edn.

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- Assignment	Written Exam
CO2	CIA2- Skill test	

9.

a) Weightage of Marks in Formative and Summative Assessments

Formative Assessment - FA (40%)	Summative Assessment - SA (60%)
CIA-20 marks	End Semester exam-30 Marks

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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 and regional	Products made from nanomaterials and their roles in human life.
National and global	Catalysts commonly used in industry/research for the synthesis of numerous compounds.

7. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	All	Current progress on the application of nanomaterials synthesized using Nano catalysts.
ED	All	Gives us an insight of fundamentals of catalysts and its development in the production process.
EMP	All	Research and knowledge helps in designing nanomaterials, which are all important skills for working in biotechnology, pharmaceuticals, and advanced materials.

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b) Question Paper Pattern

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Model Paper

B.Sc. III - Semester VI

SKILL ENHANCEMENT COURSE

MATERIAL SCIENCES AND CATALYSIS

Course Code: U24/CHE/SEC/601

Time: 1 Hr
Max. Marks: 30

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

Question Number	MODULE	Question	CO	BTL
1	Module 1	What are the different Types of Nanocatalysis?	CO 1	(Level IV)
2	Module 1	Explain the Mechanism of Nanocatalysis.	CO 1	(Level II)
3	Module 1	Write a note on Prospects of Nanocatalysis in Green Chemistry with examples.	CO 1	(Level I)
4	Module 1	Explain any 4 applications of Nanocatalysis.	CO 1	(Level I)
5	Module 2	Define catalysis. Give the characteristics of catalysis.	CO 2	(Level I)
6	Module 2	Derive Michaelis - Menten Equation.	CO 2	(Level IV)
7	Module 2	Discuss the principle of Phase transfer Catalysis.	CO 2	(Level II)
8	Module 2	Explain the kinetics of Acid-catalyzed reactions.	CO 2	(Level IV)

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SEMESTER –VI

PHARMACEUTICAL BIOCHEMISTRY

1. Course Description:

Programme : B.Sc.
Course Code : U24/BIC/DSE/602
Type of course: DSE 2B
No. of credits : 4

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

2. Course Objectives:

1. The students will be able to explore the dimensions of applied Biochemistry.
2. Students will be ready for Industries like pharmaceutical R & D, Clinical Trials.

3. Course Outcome: This course will help students in –

CO1: List and Define the principles of pharmacology and pharmaceutical biochemistry. (L 1 & 2)

CO2: Summarise and Illustrate the biochemical approach to principles of drugs and drug Mechanism (L 2 & 3)

CO3: Infer the benefits of drug components and adverse drug effects. (L4)

CO4: Assess conceptual knowledge dimensions of drugs their benefits and adverse effects. (L5)

4. Course Content

Module I: INTRODUCTION TO PHARMACOLOGY **(15 hrs)**

Introduction to Pharmacology and pharmaceutical biochemistry. Blood-Buffer System. Biological Membranes and transport systems. History of Drugs, Sources and Classification of drugs Drug nomenclature. Essential Medicines (Drugs) Concept.

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

Absorption, Bioavailability & Distribution of drugs. Routes of drug administration. Biotransformation – Metabolism of Drugs. Inhibition of Drug Metabolism. Overview of drugs as inhibitors to enzymes ACE , leukotrienes, Lipoxygenase, Cycloxygenase, DNA Polymerase Inhibitors, HIV - Protease /Reverse Transcriptase, Integrase) . Excretion & Kinetics of Elimination.

Module III: PHARMACODYNAMICS **(15 hrs)**

Principles &Mechanism of Drug action though Chemicals, Enzymes (Stimulation and Inhibition), Receptors. (Drug Receptor Interaction) Drug-dose response, combined effect of Drugs, Drug Dosage. Factors modifying Drug action.

Introduction to Chemotherapy, Miscellaneous drugs & essential drugs – their therapeutic uses & biochemical/ metabolic relevance. Role of vaccines and sera in pharmaceutics.

Module IV: ADVERSE DRUG EFFECTS **(15 hrs)**

Adverse responses – Side effects, Secondary effects, Toxic effects, Intolerance, Idiosyncrasy, and Allergy of drugs. (Mechanisms and Types of allergic reactions). Photosensitivity due to drugs. Drug Dependence – Drug abuse and addiction. Drug withdrawal reactions, Teratogenicity, Carcinogenicity, Mutagenicity. Drug induced Diseases.

5. Reference Books:

1. Essentials of Medical Pharmacology by K D Tripathi.
2. The Pharmacology volume I and II –Goodman and Gillman
3. Essentials of Pharmaceutical biochemistry including practical exercises (EDN 2) by HarbansLal, International Edition, 2019
4. Biochemistry for the pharmaceutical sciences by Charles P. Woodbury, 2011
5. Pharmacology and Pharmatherapeutics – R.S.Satoskar,S.D.Bhandhakarand
6. Lippincotts illustrated review Pharmacology
7. Clinical Chemistry by Bishop, Duben- Engelkirk&Fody.

6. Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
National	It plays a crucial role in supporting the quality, safety, and efficacy of pharmaceuticals, within India.
Global	The principles of pharmacology are applicable universally.

b. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
Employability	Module 2 & 3	Practicals

7.Pedagogy

S.No	Type/Description of activity	Student Centric Methods Adopted
1.	Seminar Presentation	Participative Learning
2.	Science Experiments	Experiential Learning
3.	Industrial training	Experiential Learning

8. Course Assessment Plan

a) Weightage of Marks in Formative and Summative Assessments

COs	Formative Assessment - FA (40%)	Summative Assessment -SA (60%)
CO1	CIA-1	End Semester exam
CO2	CIA-1	
CO3	CIA-2 Presentation/Case Studies/Video M aking.	
CO4	CIA-2 Quiz/Assignment	

b) Model Question Paper

PHARMACEUTICAL BIOCHEMISTRY

Code: U24/BIC/DSE/602 **Max Marks: 60**
Credits: 4 **Time: 2 Hrs**

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

1. (a)Discuss biological membrane transport systems.
   (OR)
   (b) Explain sources and classification of Drugs.

2. (a)Discuss routes of drug administration with examples
   (OR)
   (b)Demonstrate role of drugs as enzyme inhibitors with examples.

3. (a) Categorise factors modifying drug action.
   (OR)
   (b) Analyze essential drugs and their metabolic relevance.

4. (a)Assess adverse drug responses in brief.
   (OR)
   (b) Hypothesise on drug abuse and addiction.

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

5. Blood buffers
6. Pharmacology
7. Drug excretion
8. Cycloxygenase
9. Drug dosage
10. Chemotherapy

CBCS-2024

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

DSE 2B: Pharmaceutical Biochemistry

SECTION A - INTERNAL CHOICE (4 X 10 M = 40 M)				
Question Number	**Question**	**Question**	**CO**	**BTL (Blooms Taxonomy Level)**
1	**Module 1**	Discuss biological membrane transport systems.	**CO 1**	**2**
2	**Module 1**	Explain sources and classification of Drugs.	**CO 1**	**2**
3	**Module 2**	Discuss routes of drug administration with examples	**CO 2**	**2**
4	**Module 2**	Demonstrate role of drugs as enzyme inhibitors with examples.	**CO 2**	**3**
5	**Module 3**	Categorise factors modifying drug action	**CO 3**	**4**
6	**Module 3**	Analyze essential drugs and their metabolic relevance.	**CO 3**	**4**
7	**Module 4**	Assess adverse drug responses in brief.	**CO 4**	**5**
8	**Module 4**	Hypothesise on drug abuse and addiction.	**CO 4**	**5**
SECTION B - ANSWER ANY 4 OUT OF 6 (4Q X 5M = 20M) (To compulsorily have **ONE** question from **each** module)				
9	**Module 1**	Blood buffers	**CO 1**	**1,2**
10	**Module 1**	Pharmacology	**CO 2**	**1,2**
11	**Module 2**	Drug excretion	**CO 3**	**2,3**
12	**Module 2**	Cyclooxygenase	**CO 4**	**2,3**
13	**Any Module**	Drug dosage	**CO 3**	**4**
14	**Any Module**	Chemotherapy	CO 4	**5**

PHARMACEUTICAL BIOCHEMISTRY
PRACTICAL

1. Course Description:

Programme : B.Sc.
Course Code : U24/BIC/DSE/602/P
Type of course : DSE
No. of credits : 1

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

2. Course objective:

Prepare students for Industries like pharmaceutical R & D and Clinical Trials.

3. Course Outcome:

This course will help the students to-

CO1: Enhance knowledge on drug labels.

CO2: Analyse various components of pharmaceuticals

PRACTICAL SESSIONS

1. Phytochemical screening of a medicinal plant.
2. Qualitative Analysis of Phytochemicals
3. Estimation of Total Phenols by Folin – Ciocalteau method.
4. Estimation of Flavonoids and assessment of its medicinal role
5. Determination of Antioxidant enzyme – catalase.
6. Estimation of Bilirubin by Vanden Bergh reaction
7. Kidney Function Test & calculation of clearance.
8. Preparation of ORS.
9. Preparation of Condy's Lotion.
10. Understating drug label and drug composition
11. Case study

MODEL QUESTION PAPER
PRACTICAL

Course Code: U24/BIC/DSE/602/P
Credits: 1

Max Time: 2 Hrs
Max. Marks: 50

Answer the following:

1. Write the principle involved in the estimation of total phenols by Folin's method. (5 M)
2. Write the procedure in the preparation of ORS. (5M)
3. Estimate the concentration of the Phenols by Folin's method. (20 M)
   Conc. of Phenol Standard = 100µg/ml
4. Identify the secondary metabolite in the given sample. (10 M)
5. Viva (5 M)
6. Record (5 M)

Prepared by Course Teacher [Name & Signature]	Checked &verified by HOD [Name & Signature]	Approved by the Principal
S. Kavitha	21/12/24 (S. Malathi Varma) HOD Biochemistry St. Francis College for Women Begumpet, Hyderabad-16.	

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

SEMESTER –VI

PLANT BIOCHEMISTRY

1. Course Description

Programme : B.Sc.
Course Code : U24/BIC/DSE/601
Type of course: DSE 2A
No. of credits : 4

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

2. Course Objectives:

1. Inculcate knowledge of Plant cell structure, plant hormones, and secondary metabolites in students.
2. Enhance the skills of plant tissue culture techniques.

3. Course Outcomes: It helps the graduates to-

CO 1: Interpret the detail structure of the plant cell and basic cycles that are essential for their survival. (L2)

CO2: Illustrate the knowledge of various metabolic reactions and the uses of secondary metabolites. (L3)

CO3: Infer & assess the knowledge of various plant hormones. (L4,5)

CO4: Plan the techniques to execute plant cell culture experiments. (L6)

4. **Course Content –**

Module I: PLANT CELL STRUCTURE & PHOTOSYNTHESIS **(15 hrs)**

Plasma membrane, vacuole and tonoplast membrane, cell wall, plastids and peroxisomes, Photosynthetic pigments, absorption and action spectra, Red drop and Emerson Enhancement effect, concept of two photosystems, Light reactions. Cyclic and non-cyclic photophosphorylation. Dark reactions, Calvin cycle and regulation; C4 cycle and Crassulacean acid metabolism (CAM), Photorespiration

Module II: NITROGEN METABOLISM AND SECONDARY METABOLITES (15 hrs)

Nitrogen Cycle. Nitrogen Metabolism: Mechanism and Regulation of Utilization of Ammonia, Nitrate and other Nitrogen Sources, Nitrogen Fixation: Mechanism and Regulation of Nitrogen Fixation, Symbiotic and Asymbiotic Nitrogen Fixation and Biochemistry of Nitrogenase.

Representatives of alkaloid group and their amino acid precursors, function of alkaloids,

Examples of major phenolic groups: flavonoids, tannins and lignin, biological role of plant phenolics.

Module III: PLANT HORMONES AND STRESS PHYSIOLOGY **(15 hrs)**

Introduction to plant hormones and their effect on plant growth and development. Structure, Function and commercial applications of Auxins, Gibberellins, Cytokinins, Abscissic acid, Ethylene and Brassino steroids and their derivatives.

Responses of plants to biotic stress (pathogen and insects) HR and SAR mechanisms and abiotic stress (water, temperature and salt) Drought tolerance mechanisms.

Module IV: PLANT TISSUE CULTURE **(15hrs)**

Cell and tissue culture techniques, types of cultures: organ and explant culture, callus culture, cell suspension culture and protoplast culture. Plant regeneration pathways: organogenesis somatic embryogenesis. Applications of cell and tissue culture and soma clonal variation

5. **Reference Books:**

1. Caroline Bowsher, Martin steer, Alyson Tobin Plant Biochemistry (2008), Garland Science ISBN 9780-8153-4121-5
2. Buchanan: Biochemistry and molecular Biology of plant. (2005) 1 edition. I K International, ISBN-10: 8188237116, ISBN-13: 978-8188237111.
3. P.M Dey and J.B. Harborne; (1997): Plant Biochemistry, Academic Press ISBN-10:0122146743
4. Robert H. Smith , Plant Tissue Culture, Techniques and Experiments (2005) Academic Press, 2012 ISBN 0323160476, 9780323160476

6. Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Global	Its applications extend to various fields, making it a crucial area of study with significant global relevance.
National	It holds national relevance by contributing to enhanced agricultural productivity, and advancements in research.

b) Components on Skill Development/Entrepreneurship development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
Skill Development	Module 4	Hands on practicals on Plant tissue culture

7. Pedagogy

S.No	Type/Description of activity	Student Centric Methods Adopted
1.	Field trips	Experiential Learning
2.	Research projects	Problem Solving
3.	Workshops	Participative Learning

8. Course Assessment Plan

a) Weightage of Marks in Formative and Summative Assessments

COs	Formative Assessment - FA (40%)	Summative Assessment - SA (60%)
CO1	CIA-1	End Semester exam
CO2		
C03	CIA-2 Presentation/ Model making/Quiz/ Assignment	
C04	CIA-2 Objective test	

b) Model Question Paper

PLANT BIOCHEMISTRY

Code : U24/BIC/DSE/601 **Max. Marks: 60**
Credits : 4 **Time :2 Hrs**

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

1. (a)Describe the fluid Mosaic model of Plasma Membrane.
   OR
   (b) Explain plastids & add a note on significance of peroxisomes.

2. (a)Illustrate in detail Cyclic & Non-Cyclic Photophosphorylation.
   OR
   (b)Illustrate Nitrogen Cycle with appropriate diagram.

3. (a)Analyze the mechanism of growth regulation by plant hormones.
   OR
   (b)Compare different secondary metabolites with biological significance.

4. (a)Compile various Cell & Tissue Culture Techniques.
   OR
   (b)Compose the various Plant Regeneration Pathways?

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

5.Cell Wall

6. CAM

7. Tannins & Lignins

8. Functions of Alkaloids

9. Auxins

10. Gibberlins

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

Semester V: DSE 2A- Plant Biochemistry

SECTION A - INTERNAL CHOICE (4 X 10 M = 40 M)				
Question Number	**Question**	**Question**	**CO**	**BTL (Blooms Taxonomy Level)**
1	**Module 1**	Describe the fluid Mosaic model of Plasma Membrane.	**CO 1**	**2**
2	**Module 1**	Explain plastids & add a note on significance of peroxisomes.	**CO 1**	**2**
3	**Module 2**	Illustrate the mitochondrial electron transport chain.	**CO 2**	**3**
4	**Module 2**	Illustrate in detail Cyclic & Non-Cyclic Photophosphorylation.	**CO 2**	**3**
5	**Module 3**	Illustrate Nitrogen Cycle with appropriate diagram.	**CO 3**	**3**
6	**Module 3**	Analyze the mechanism of growth regulation by plant hormones.	**CO 3**	**4**
7	**Module 4**	Compile various Cell & Tissue Culture Techniques.	**CO 4**	**6**
8	**Module 4**	Compose the various Plant Regeneration Pathways.	**CO 4**	**6**
SECTION B - ANSWER ANY 4 OUT OF 6 (4Q X 5M = 20M) (To compulsorily have **ONE** question from **each** module)				
11	**Module 1**	Cell Wall	**CO 1**	**2**
12	**Module 1**	CAM	**CO 2**	**2**
13	**Module 2**	Tannins & Lignins	**CO 3**	**3**
14	**Module 2**	Functions of Alkaloids	**CO 4**	**3**
15	**Any Module**	Auxins	**CO 5**	**4,5**
16	**Any Module**	Gibberlins	CO5	**6**

PLANT BIOCHEMISTRY
PRACTICAL

1. Course Description:

Programme : B.Sc.
Course Code : U24/BIC/DSE/601/P
Type of course : DSE
No. of credits : 1

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

2. Course Objectives:

Introduce the basic practical knowledge of plant biochemistry.

3. Course Outcome: This course will help the students to-

CO1: Assess various plant contents like pigments and secondary metabolites. (L5)

CO2: Prepare the procedure and technique of Plant tissue culture.(L6)

PRACTICAL SESSIONS

1. Estimation of Total Soluble Sugar.
2. Estimation of Total phenolic content using Folin-Ciocalteau method
3. Qualitative Analysis of Phytochemicals
4. Estimation of Carotene.
5. Estimation of Lycopene content of tomato.
6. Estimation of Pectin Substances as Calcium Pectate
7. Determination of Antioxidant activity by DPPH method.
8. Separation of Plant pigments by Thin Layer Chromatography
9. Determination of Catalase Enzyme activity
10. Plant tissue culture (Demo)

MODEL QUESTION PAPER
PRACTICAL

Course Code: U24/BIC/DSE/601/P **Max Time: 2 Hrs**
Credits: 1 **Max. Marks: 50**

Answer the following:

1. Write the principle involved in the estimation of total phenol by Folin-Ciocalteau Method (5M)
2. Estimate the concentration of total phenol by Folin-Ciocalteau Method.
   Conc of Std. Catechol = 10 µg/ml (20M)
3. Identify the given Phytochemicals in the given sample. (15M)
4. Viva (5M)
5. Record (5M)

Prepared by Course Teacher [Name & Signature]	Checked &Verified by HOD [Name & Signature]	Approved by the Principal
	21/2/24 (S. Malathi Varma) HOD Biochemistry St. Francis College for Women Begumpet, Hyderabad-16.	

Professor Karuna Rupula
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St. FRANCIS COLLEGE FOR WOMEN, BEGUMPET, HYDERABAD-500016

(An Autonomous College Affiliated To Osmania University)

FACULTY OF SCIENCE- DEPARTMENT OF CHEMISTRY

THEORY SYLLABUS CBCS-2024

SEMESTER -VI

POLYMER CHEMISTRY

1. Course Description

Program: B.Sc. Max.
Course Code: U24/CHE/DSE/602
Course: DSE- 4
No. of Credits: 4

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

2. Course Objectives

- To familiarize the students with the mechanism of polymerization and determination of their molecular mass.
- To introduce different levels of polymer structures and significance of Tg and Tm.
- To learn about different types of polymers.
- To understand the factors that influence the degradation of polymers.

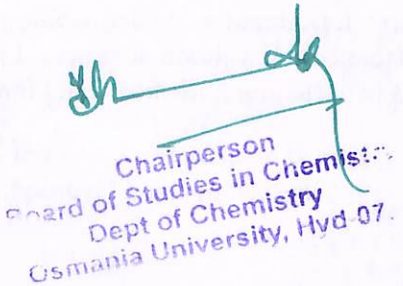
3. Course Outcomes

CO 1: Understand the different mechanisms of polymerization and methods of their molecular weight determination.

CO 2: Apply the knowledge of polymer structure to Tg and Tm.

CO3: Understand synthesis, properties and applications of rubbers and plastics.

CO 4: Develop fundamental knowledge of fibers, biodegradable polymers and polymer degradation.



POLYMER CHEMISTRY

4. Course Syllabus

Module 1: Polymerisation 15 Hrs

Introduction to Polymers, Classification of polymers based on structure, chemistry of polymerisation, addition polymerisation, copolymerisation, condensation polymerisation, coordination polymerisation, Ziegler-Natta catalyst, Kinetics of polymerization - Free radical chain polymerization, Cationic polymerization, Anionic polymerization.

Degree of polymerisation, physical properties, weight average number average molecular weight. Experimental methods of molecular weight determination- End group analysis, Viscometry and Light scattering.

Module 2: Crystallinity and Glass transition temperature 15 Hrs

Determination of crystalline melting point and degree of crystallinity. Factors affecting crystalline melting point. Effect of crystallinity on properties of polymers. Helix structures, Spherulites, Polymer single crystals. Glass Transition temperature (T_g). Factors affecting glass transition temperature. Importance of Glass Transition temperature, T_g and molecular weight, T_g and plasticisers, T_g and copolymers, T_g and melting point. Heat distortion temperature.

Module 3: Rubbers and Plastics 15 Hrs

Natural rubbers, drawbacks of natural rubber, vulcanization, rubber compounding, foamed rubbers, gutta-percha rubber, properties and applications of synthetic rubbers- poly isoprene, poly buta- diene, poly styrene butadiene, neoprene rubbers, nitrile rubbers, polysulfide rubbers.

Thermosetting and thermoplastics. Thermoplastics: poly olefins, poly styrene, PVC, teflon, their preparation, structure and applications. Thermosetting plastics: phenolic resins, amino resins, polyester resins, epoxy resins - preparation, structure and applications. Laminates and fabrication of plastics. Types and properties of Silicones and Adhesives.

Module 4: Fibers, biodegradable polymers and Polymer degradation 15 Hrs

Natural and synthetic fibers, study of synthetic fibers- polyamides, poly esters, poly acrylates.

Biodegradable Polymers: Introduction, biodegradation mechanism and properties of starch based polymers, polyesters, water soluble polymers. Environmental impacts. Applications of biodegradable polymers in agriculture, medicine and food packaging industry.

Polymer degradation: Types of degradation- thermal degradation, mechanical degradation, Photo degradation. Oxidative degradation and Hydrolytic degradation.

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5. References

1. Vasant R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar, *Polymer science*, New Age International, 1986.
2. Vermani.O.P. Narula.A.K. (2004*), Industrial Chemistry*, New Delhi, Galgotia Publications Pvt Ltd.
3. Gopalan.R, Venkappayya & Nagarajan.S, (2005), *Textbook of Engineering Chemistry* (3rd edition) New Delhi,Vikas Publishing House Pvt. Ltd.
4. Jain and Jain , *Engineering chemistry* Dhanpat Raj Publishing company
5. Principles of Physical Chemistry by Puri, Sharma and Pathania, 2017.
6. Text Book of Physical Chemistry P.L Soni, O.P Dharmaha, U.N Dash.
7. Physical Chemistry by Atkins and De Paula, 8 th Edn.
8. Chatwal. R.G., (2006) Chemistry and Industry, New Delhi, Himalaya Publishing House.

6. Syllabus Focus

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

Local /Regional/National/ Global Development Needs	Relevance
Local	Products made from polymers and its unforgettable roles in human life.
Regional	Polymers are commonly being used in catalytic applications as supports for compounds.
National	Polymers are crucial due to their versatility, cost-effectiveness and wide applications in various industries.

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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	All	Advancement of polymers processing techniques of exciting possibilities for creating novel polymer based elements and devices.
ED	All	Give us an insight of fundamentals of polymer business and its development in the production process.
EMP	All	Research and knowledge helps in designing machinery procurement.

7. Pedagogy

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

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8. Course Assessment Plan

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

CO	Continuous Internal Assessments CIA - 40%	End Semester Examination-60%
CO1	CIA1-Written Exam	Written Exam
CO2	CIA1-Written Exam	
CO3	CIA2- Role Play	Written Exam
CO4	CIA2- Group Survey	

b. Model Question Paper - End Semester Exam

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

TIME: 2hrs **Course Code: U24/CHE/DSE/602**
Max. Marks: 60

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

Question Number	Question		CO	BTL
1	Module 1	Outline the mechanism of free-radical addition polymerization and Coordination polymerization. 10M **OR**	CO 1	(Level I)
2	Module 1	What is the average molecular weight? How is it determined by viscometry? 10M	CO 1	(Level I)
3	Module 2	a) Define crystalline melting point and discuss the factors affecting crystalline melting point. 5 M b) How does the crystalline melting point affect the properties of polymers? 5 M	CO 2	(Level III)

		OR		
4	**Module 2**	a) What is Glass Transition temperature (T_g). Explain the factors affecting glass transition temperature. 5M b) Describe the relationship between Tg and molecular weight. 5M	**CO 2**	**(Level I)**
5	**Module 3**	a) Why does natural rubber require vulcanisation and how is it done? 5 M b) Write the preparation, properties and applications of poly isoprene and poly styrene butadiene rubbers. 5 M **OR**	**CO 3**	**(Level II)**
6	**Module 3**	a) Differentiate between thermoplastics and thermosetting plastics. 5 M b) Discuss the synthesis, properties and applications of PVC and phenolic resins. 5 M	**CO 3**	**(Level I)**
7	**Module 4**	Explain the synthesis, properties and applications of polyamides and polyesters. 10 M **OR**	**CO 4**	**(Level II)**
8	**Module 4**	What are biodegradable polymers? Explain the biodegradation mechanism of starch based and water soluble polymers. 10 M	**CO 4**	**(Level I)**
SECTION B - ANSWER ANY 4 OUT OF 6			**4 X 5 M = 20 M**	
9	**Module 2**	Write short notes on helix structures and polymer single crystals.	**CO 1**	**(Level I)**
10	**Module 1**	How are the polymers classified based on their structure? Give suitable examples.	**CO 1**	**(Level I)**
11	**Module 3**	Discuss briefly about fabrication of plastics.	**CO 2**	**(Level II)**
12	**Module 1**	What is copolymerisation? Give the classification of copolymers.	**CO 2**	**(Level II)**
13	**Module 3**	Explain the applications of biodegradable plastics.	**CO 3**	**(Level II)**
14	**Module 4**	Write about thermal and photodegradation of polymers.	**CO 4**	**(Level II)**

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SEMESTER -VI
PROJECT

1. Course Description:

Programme: B.Sc.
Course Code: U20/BIC/PRJ/601
Type of course: Project
No. of credits: 4

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

2. Course Objectives:

Our graduates will be able to design an experimental procedure, tabulate and interpret the obtained results.

3. Course Outcome:

CO1: Plan appropriate research topics through review of literature.

CO 2: Prepare to work autonomously in an effective manner, setting and meeting deadlines.

CO 3: Design experiments, prepare appropriate methodologies, perform critical analysis and interpretation of results.

CO 4: Compose project to thesis that includes aim, objectives, methodologies, and potential outcomes.

PROJECT PLAN & ASSESMENT

- Every student has to complete one project in any one of the optional subjects.
- Each faculty of the Dept. will supervise 5 students.
- The topic of the project would be selected by each student in consultation with the faculty to whom she is assigned.
- The students will be trained to retrieve the literature and collate the information sufficient to make a presentation, the collated literature would also prepare the base for initiating the research.
- The student would carry out experiments in the lab to achieve the planned objectives.
- The collation and analysis of experimental data would lead to the presentation of the result in the form of a Dissertation.
- The evaluation includes submission of project report and viva. Continuous evaluation includes punctuality, hard work, record keeping, intellectual inputs, data presentation, interpretation etc.

Internal Evaluation of Project-40 M

Scheme of evaluation

1. Synopsis - Submission & Presentation (10 M)
2. Mid Term Evaluation (10 M)
3. Project Presentations (20 M)

External Evaluation -60 M (External Examiner)

Prepared by Course Teacher [Name & Signature]	Checked &verified by HOD [Name & Signature]	Approved by the Principal
	21/2/24 (S. Malathi Varma) HOD Biochemistry St. Francis College for Wom... Begumpet, Hyderabad-...	

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

SEMESTER - VI

QUALITY SUSTENANCE IN INDUSTRY

1. **Course Description:**
   Programme: B.Sc.
   Course Code: U24/MIC/SEC/601
   Course Type: SEC
   No. of credits:2

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

2. **Course Objectives:**

- To gain concepts in QC and QA for food processing and validation of processed food products.
- To Gain knowledge about aseptic operation, containment levels, biosafety, GMP, HACCP in foods, cosmetics and pharmaceuticals.

3. **Course Outcomes:**

CO1: Understand the importance of Aseptic Operation, containment and assessment of aseptic conditions. Interpretation of the quality of air, water and milk.

CO 2: Evaluate Qualitative risk analysis of food products, cosmetics, pharmaceutical products, and textiles. Document, preparation for QC/QA norms.

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4. Course Content:

MODULE I- Basic Concepts of QA QC- Aseptic Operation & Containment: **(15 hrs)**

Aseptic Operation and Containment. Laboratory, assessment of aseptic condition, evaluation of possible channels of contamination (air sampling). Water analysis by MPN method. Estimation of Calcium concentration in milk sample by titrimetric. Estimation of fat in milk by Babcock's method. Detection of adulterants in milk.

MODULE II- GMP & HACCP in Industry : **(15 hrs)**

Good Manufacturing Practices and Hazard Analysis Critical Control Points (HACCP) in foods, cosmetics Chemical testing for cosmetics. Qualitative risk analysis of food products (adulterant analysis). Chemical testing for pharmaceutical products. Textiles Quality Control Standards and Testing Procedures. Document preparation for QC/QA norms of different sectors.

5. Resources:

Text books:

1. Peter F. Stanbury, Allan Whitaker and Stephen J. HallPrinciples of Fermentation Technology,Second Edition ,Pergamon.
2. James P. Agalloco, Frederick J. Carleton,Validation of Pharmaceutical Processes, Third Edition,CRC press.
3. Kenneth E. Avis, Carmen M. Wagner, Vincent L. Wu, (1998), Biotechnology: Quality Assurance and Validation by CRC Press.
4. Quality assurance of pharmaceuticals (2006),A compendium of guidelines and related materials Volume 2, 2nd updated edition Good manufacturing practices and inspection.
5. Stephanie Clark ,Stephanie Jung ,Buddhi Lamsal,Food Processing: Principles and Applications, 2nd Edition,Wiley publishers.

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Reference Books:

1. Pharmaceutical Quality Assurance, MA Potdar, NiraliPrakashan, Pune
2. Validation of Pharmaceutical process, F. J. Carleton and J. Agalloco, Marcel Dekker Inc.
3. Pharmaceutical Process Validation, Second Ed., Ira R. Ferry & Robert Nash., Marcel Dekker Inc.
4. Quality Planning & Analysis by J. M. Juran and F. M. Gryna, Tata Mcgraw Hill, India.
5. Improving Quality through Planned experimentation by Moen, Tata Mcgraw Hill.
6. Good Manufacturing Practices for Pharmaceutical; A Plan for total Quality Control, 4 th Ed, Sidney willing.
7. Quality Assurance Guide by Organization of Pharmaceutical producers of India. 8. Pharmaceutical Process Validation; By F. R., Berory and Robert A. Nash 9. Impurities Evaluation of Pharmaceutical; Satinder Ahiya Marcel Decker.
8. Quality Control of Packaging material in the Pharmaceutical Industry: Kenneth Harburn, Marcel Dekker.
9. Juran's Quality Control Handbook J.M. Jupron.4th Ed. Good design practices for GMP Pharmaceutical facilities. Andrew A Signature, Marcel Dekker.
10. cGMP for Pharmaceuticals. Pharma. Med. Press, Ist edition by Manohar H. Potdar
11. Methods in Food Analysis by Rui M. S. Cruz, Igor Khmelinskii, Margarida Vieira.
12. Fundamental Food Microbiology, Fifth Editionby Bibek Ray, Arun Bhunia.
13. Managing Food Safety Risks in the Agri-Food Industriesby Jan Mei Soon, Richard Baines.
14. Quality Control and Total Quality Management by by Jain P L Jain Tata McGraw-Hill Education publishers .
15. C. Rosamund M. Baird, Norman A. Hodges, Stephen P. Denyer,(2000),Handbook of Microbiological Quality Controlharmaceuticals and Medical devices,CRC press.

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5. **Syllabus Focus:**

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

Local /Regional/National /Global Development Needs	Relevance
Global Development Needs	Exploring the concepts of HACCP, enhancing the skills related to Quality sustenance in Industry.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
EMP	Module II	One is equipped with knowledge related to maintaining and assessing quality. Identify and set critical control points for continuous assessment of quality in Industry.

6. **Course Assessment Plan:**

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

Continuous Internal Assessments CIA - 20%	End Semester Examination-30%
CIA - Written Exam	Practical and written exam

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b) Model Question Paper

QUALITY SUSTENANCE IN INDUSTRY
INTERNAL EXAM

Max. Marks: 20
Time: 1 Hrs

I. Write a detailed note on HACCP followed in milk and milk products industry.

QUALITY SUSTENANCE IN INDUSTRY
MODEL QUESTION PAPER- SEM END EXAM

Course Code: U24/MIC/SEC/601 **Max.Marks: 30**

No. of credits: 2 **Time: 1Hrs**

I. Major **(8marks)**

1. Estimate the concentration of calcium in the given sample by titrimetric method.

II. Minor **(5 marks)**

2. Test the cosmetic provided for hazard metals and report the quality.

III. Comment on given specimens C, D and E **(3x4=12 marks)**

IV. Viva / Record **(5 marks)**

Prepared by Faculty	Checked and verified by HoD	Approved by the Principal
Ms.K.Suman	Dr. P.Roselin	Dr.Uma Joseph

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SEMESTER –VI

SEC-4 RESEARCH METHODOLOGY

1. Course Description:

Programme: B.Sc. **Max. Hours: 30**
Course Code: U24/BIC/SEC/601 **Hours per week: 2**
Type of course: SEC 4 **Max. Marks: 50**
No. of credits: 2

2. Course Objectives:

- This course aims to provide students with a knowledge on the construction of good research design.
- Permit students to evaluate the data and acquire proficiency in report writing.

3. **Course Outcome:** This SEC paper will help students to enhance their overall skills to-

CO 1: Create a good research design (L6)

CO2: Generate a report(L6)

4. Course Content

Module I: INTRODUCTION TO RESEARCH METHODS (15 hrs)

Definition of Research, role and objectives of research. Collecting and reviewing literature, conceptualization and formulation of a research problem, identifying variables, constructing hypothesis, synopsis. Selecting and defining research problem, need for research design, features of a good research design, different research designs (exploratory, descriptive experimental and diagnostic research)

Module II: DATAANALYSIS & SCIENTIFIC PAPER WRITING (15 hrs)

Data collection & Analysis: Primary & Secondary data, Validity and Reliability of data collection procedures, data preparation. Preparation of Manuscript- Review, Research article. Scientific paper writing: Structure of a Research Paper, Referencing and various formats for reference writing, Bibliography, Thesis Writing.

5. Reference Books:

1. Kothari C.R., " Research Methodology, Methods and Techniques, Second Edition, (2008), New Age International Publibcation.
2. Dawson, C, (2002). Practical research methods, UBS Publishers, New Delhi.
3. Ranjith Kumar: Research Methodology, A step by step guide for beginners, Pearson Education, Sixth Edition 2009.

6. Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Global	Essential for addressing global challenges and applicability of research findings across diverse contexts.

b. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
Skill	Module 1 & 2	Trains students in Scientific paper writing

7. Course Assessment Plan

Weightage of Marks in Formative and Summative Assessments

Formative Assessment - FA (40%)	Summative Assessment - SA (60%)
CIA-20 marks Review paper writing/ Mini research proposal writing	**End Semester exam-30 Marks**

EXTERNAL- MODEL QUESTION PAPER

Course Code: U24/BIC/SEC/601 **Max Time: 1 Hr**
Credits: 2 **Max. Marks: 30**

Answer the following:

1. Categorize the different types of research designs? (10M)
2. Compare the primary and secondary data collection. (10M)
3. Demonstrate the different types of referencing an article. (5M)
4. Compose hypothesis writing. (5M)

Prepared by Course Teacher [Name & Signature]	Checked &verified by HOD [Name & Signature]	Approved by the Principal
21/2/24	21/2/24 (S. Malathi Varma) HOD Biochemistry St. Francis College for Women Begumpet, Hyderabad-16.	

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