

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
ADVANCED INORGANIC CHEMISTRY

1. Course Description

Program: B.Sc.
Course Code: U24/CHE/DSE/601
Course: DSE 3
No. of Credits: 3

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

2. Course Objectives

- To enable the students to understand the concepts of Coordination chemistry and its applications and Inorganic reaction mechanisms of metal complexes.
- The course aims at giving an overview on principles and types of pericyclic reactions, colloids and surface chemistry
- To understand the basic principles and to develop skills in interpretation of various spectra in elucidation of structure of simple molecules.

3. Course Outcomes

- CO1: Understand the concepts of Coordination Chemistry in elucidating the structures of complexes and apply in isomerism.
- CO2: Understand the reaction mechanisms in metal complexes with applications. Interpret the concepts and applications of HSAB.
- CO3: Understand and apply the principles of spectroscopy in solving the problems related to structural analysis of simple organic molecules.
- CO4: Elaborate on the concepts of synthetic organic chemistry. To help the students acquire knowledge on the basic principles of colloids and surface chemistry.


Chairperson
Board of Studies in Chemistry
Dept of Chemistry
Osmania University, Hyd-07.


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

4. Course Content

MODULE I: COORDINATION CHEMISTRY

15 Hrs

Werner's theory – postulates, experimental evidence. Sidgwick's theory – Calculation of EAN, limitations. Nomenclature of inorganic complex compounds.

Valence bond theory – postulates, geometries of coordination number 4 & 6- tetrahedral $[\text{Ni}(\text{NH}_3)_4]^{2+}$, $[\text{NiCl}_4]^{2-}$ and $[\text{Ni}(\text{CO})_4]$, square planar $[\text{Ni}(\text{CN})_4]^{2-}$, $[\text{Cu}(\text{NH}_3)_4]^{2+}$, $[\text{PtCl}_4]^{2-}$. Octahedral complexes $[\text{Fe}(\text{CN})_6]^{4-}$, $[\text{Fe}(\text{CN})_6]^{3-}$, $[\text{FeF}_6]^{4-}$, $[\text{Co}(\text{NH}_3)_6]^{3+}$, $[\text{CoF}_6]^{3-}$. Limitations of VBT Crystal field theory – features, splitting of d-orbitals, in octahedral, tetrahedral and square planar complexes, Crystal field stabilization energy (calculation of CFSE for d^n configurations in octahedral complexes),

Magnetic properties of transition- metal complexes: Types of magnetic behaviour, spin only formula, calculation of magnetic moments using spin only formula.

Electronic spectra of metal complexes – d-d transitions, spectrochemical series, Electronic absorption spectrum of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$. Determination of composition of complexes - Job's method and mole ratio method.

Thermodynamic and kinetic stability of transition metal complexes. Stability of metal complexes –step wise and overall stability constant and their relationship and chelate effect.

Isomerism in coordination compounds: structural: ionization, hydrate, linkage, co- ordination, coordination- position and polymerisation isomerism. Stereo isomerism – (a) geometrical isomerism in (i) square planar metal complexes of the type $[\text{MA}_2\text{B}_2]$, $[\text{MA}_2\text{BC}]$, $[\text{M}(\text{AB})_2]$, $[\text{MABCD}]$. (ii) Octahedral metal complexes of the type $[\text{MA}_4\text{B}_2]$, $[\text{M}(\text{AA})_2\text{B}_2]$, $[\text{MA}_3\text{B}_3]$ using suitable examples, (b) Optical isomerism in (i) Tetrahedral complexes $[\text{MABCD}]$, (ii) Octahedral complexes $[\text{M}(\text{AA})_2\text{B}_2]$, $[\text{M}(\text{AA})_3]$ using suitable examples.

Applications of coordination compound

Applications of coordination compounds a) in quantitative and qualitative analysis with suitable examples b) in medicine for removal of toxic metal ions and cancer therapy c) in industry as catalysts polymerization – Ziegler Natta catalyst d) water softening.

MODULE II: INORGANIC REACTION MECHANISM AND HSAB

15 Hrs

Inorganic Reaction Mechanism

Lability and inertness of complexes

Substitution Reactions – dissociation and association reactions, mechanism for SN^1 and SN^2 in octahedral and square planar complexes with one example each. Trans effect –theories and applications. Acid Hydrolysis (mechanism) and Base Hydrolysis (mechanism). Electron transfer reactions – outer sphere and inner sphere mechanism (brief account only) – two electron transfer reactions.

Hard and soft acids and bases

Classification, Pearson's concept of hardness and softness, application of HSAB principles, stability of complexes, predicting the feasibility of a reaction.

MODULE III: MOLECULAR SPECTROSCOPY -II

15 Hrs

NMR Spectroscopy

5 Hrs

Principles of nuclear magnetic resonance, number of signals, equivalent & non equivalent protons, position of signals-chemical shift. NMR splitting of signals, Spin-Spin coupling,

coupling constants. Application of NMR with suitable examples-Ethyl bromide, Ethanol, Acetaldehyde, 1,1,2-Tribromoethane, Ethylacetate, Toluene & Acetophenone.

Mass Spectrometry

5 Hrs

Basic principles – Nitrogen rule, Types of ions: Molecular ion / parent ion, fragment ions / daughter ions. Theory – formation of parent ions. Representation of mass spectrum. Identification of parent ion, (M+1), (M+2), base peaks (relative abundance 100%) Determination of molecular formula – Mass spectra of ethyl benzene, ethyl bromide, acetophenone, n-butylamine and 1- propanol.

Spectral interpretation

2 Hrs

Interpretation of IR, UV-Visible, H^1 -NMR and mass spectral data of the following compounds 1. Phenylacetylene 2. Acetophenone 3. Cinnamic Acid 4. para-nitro aniline.

Electron Spin Resonance

3 Hrs

Electron Spin Resonance (ESR) spectroscopy: Basic principle, hyperfine structure, ESR of simple radicals like $H^\cdot$, $CH_3^\cdot$ and $CH_3CH_2^\cdot$.

MODULE IV: COLLOIDS, SURFACE CHEMISTRY & PERICYCLIC REACTIONS

15 Hrs

Colloids & Surface Chemistry

9 Hrs

Definition of colloids. Classification of colloids. Solids in liquids (sols): preparations and properties – Kinetic, Optical and Electrical stability of colloids. Protective action. Hardy–Schultz law, Gold number. Liquids in liquids (emulsions): Types of emulsions, preparation and emulsifier. Liquids in solids(gels): Classification, preparations and properties, General applications of colloids. Adsorption: Types of adsorption. Factors influencing adsorption. Freundlich adsorption isotherm. Langmuir theory of unilayer adsorption isotherm. Applications.

Photochemistry

6 Hrs

Interaction of radiation with matter, difference between thermal and photochemical process. Laws of photochemistry- Grothus Draper law, Stark Einstein law. Quantum yield, Problems based on quantum efficiency. photochemical combinations of Hydrogen- Chlorine & Hydrogen –Bromine. Jablonski diagram depicting various processes occurring in an excited state. Qualitative description of Fluorescence, phosphorescence, non-radiative process (internal conversion, intersystem crossing).

5. References

1. 30.Wahid.U.Malik, Tuli G.D and Madan R.D (1976) *Selected topics in Inorganic Chemistry*: S.Chand Publishers
2. Puri B.R, Sharma L.Rand Khalia K.C (2014) *Principles of Inorganic Chemistry*: Milestone publishers and Distributers.
3. Tuli G.D, Madan R.D, Basu S.K, Sathyaprakash. *Advanced Inorganic Chemistry Volume II*: S.Chand and company Ltd (New Delhi ,India)
4. Sharma, Y.R. *Text Book of Complete Organic Chemistry*, 2nd Edn. Kalyani, 2007.
5. Jain, M.K. & Sharma, S.C. *Modern Organic Chemistry*, 4th Edn. Vishal, 2009.
6. Sharma Y.R (2005) *Elementary Organic Spectroscopy; Principles and Chemical applications* : S.Chand & Company Ltd
7. Puri, B.R., Sharma L.R., and Pathania, M.S. (2003). *Elements of Physical Chemistry*. Jalandhar, Delhi: Vishal Publishing Co.
8. Bahl, A., & Tuli. (2009). *Essentials of physical chemistry: A textbook for B. Sc. classes as per UGC model syllabus* (Rev. multicoloured.). New Delhi: S. Chand.

St. FRANCIS COLLEGE FOR WOMEN, BEGUMPET, HYDERABAD-500016
(An Autonomous College Affiliated To Osmania University)

FACULTY OF SCIENCE- DEPARTMENT OF CHEMISTRY
PRACTICAL SYLLABUS CBCS-2024

SEMESTER -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:

- Catalytic Decomposition of Hydrogen Peroxide.
- Acid catalyzed hydrolysis of methyl acetate.
- Kinetic study of oxidation of I⁻ by K₂S₂O₈.

Colorimetry:

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

pH metry:

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

Preparation of Complexes:

- To prepare a complex of tetraammine copper II sulphate complex.
- To prepare a complex of chloropentaamminecobalt III chloride.
- To prepare a complex of hexammine nickel II chloride.

References

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

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	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.
EMP		
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

		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)	


 Chairperson
 Board of Studies in Chemistry
 Dept of Chemistry
 Osmania University, Hyderabad,


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

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

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 $[\text{Cu}(\text{NH}_3)_4]$ 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 $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-OH}$ 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 Fluorescence and Phosphorescence? Explain the phenomenon of fluorescence 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 $[\text{Co}(\text{NH}_3)_6]$ and $[\text{FeF}_6]^{3-}$ (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)

Chairperson
Board of Studies in Chemistry
Dept of Chemistry
Osmania University, Hyderabad.

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

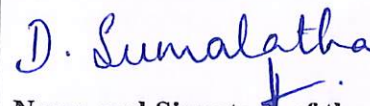
11. Describe the acid hydrolysis of octahedral complexes. (L2)
12. Define Hardy Schulze rule and Gold number. (L1)
13. Show how the molecular formula of a compound is determined based on its Mass spectrum? (L1)
14. List out the various types of NMR signals expected for 1,1,2-tribromoethane? What is the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


 Chairperson
 Board of Studies in Chem.
 Dept of Chemistry
 Osmania University, Hyderabad-500 007.


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

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****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 $[\text{Cu}(\text{NH}_3)_4]$ 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 $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-OH}$ 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 Fluorescence and Phosphorescence? Explain the phenomenon of fluorescence and phosphorescence using Jablonski diagram.	CO4	Level 2

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 $[\text{Co}(\text{NH}_3)_6]$ and $[\text{Fe}_6]^{3-}$	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

CELL AND MOLECULAR BIOLOGY

1. Course Description

Program:	B. Sc	Max. Hours:	60
Course Code:	U24/ BOT/ DSE/601	Hours per week:	4
Type of Course:	DSE - 3	Max. Marks:	60
No. of Credits:	4		

2. Course Objectives

1. To describe the cellular components and the cell division.
2. To explain the basic principles of inheritance at the molecular, cellular and organism levels.

3. Course Outcomes

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

- CO1: Discuss cell theory, types of cell division and the ultrastructure of plant cells and organelles.
 CO2: Explain the structure of nucleus, mutation types and their causes along with the significance of mobile genetic elements
 CO3: Interpret the structure of genetic material and the mechanism of DNA replication
 CO4: Discuss the regulation of gene expression and infer the process of transcription and translation

4. Course Content

Module I: Cell as a Module of Life

15 Hours

- 1.1. The Cell Theory; Prokaryotic and eukaryotic cells; Cell size and shape; Cell organelles- Mitochondria, Chloroplast. ER, Golgi body, Lysosomes, Peroxisomes and Glyoxisomes.
- 1.2. The functions of cell membranes; Models of cell membrane structure; the fluidity of membrane. Membrane proteins and their functions; Carbohydrates in the membrane; Faces of the membranes; Selective permeability of the membranes; Cell wall.
- 1.3. Overview of Cell cycle, Mitosis and Meiosis; Molecular controls- cyclins and cyclin dependent kinases

Module II: Genome Organization

15 Hours

- 1.1. Nucleus: Nuclear Envelope- structure of nuclear pore complex; chromatin; molecular organization, DNA packaging in eukaryotes, euchromatin and heterochromatin, nucleolus and ribosome structure (brief).

- 2.2. Linear and circular DNA molecules. Gene and chromosomal mutation – types, causes and detection, mutant types – lethal, conditional, biochemical, germinal vs somatic mutants
- 2.3. Basic idea about Mobile genetic elements - IS elements and transposons, insertional mutagenesis

Module III: DNA replication**15 Hours**

- 3.1. Genetic material DNA: Miescher to Watson and Crick- historic perspective, Griffith's and Avery's transformation experiments, Hershey-Chase bacteriophage experiment.
- 3.2. DNA structure, types of DNA (A, B, and Z DNA)
- 3.3. DNA replication (Prokaryotes and eukaryotes), bidirectional replication, semi-conservative model

Module IV: Gene expression**15 Hours**

- 4.1. Concept of gene, One gene one enzyme, One gene one polypeptide hypothesis, the central dogma, reverse transcription.
- 4.2. Transcription (Prokaryotes and Eukaryotes -Types of structures of RNA (mRNA, tRNA, rRNA), RNA polymerase- various types; Translation (Prokaryotes and eukaryotes), genetic code.
- 4.3. Regulation of gene expression Prokaryotes: Lac operon and Tryptophan operon.

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

Sushama

Mahesh

Ram

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

5. Reference Books

1. Karp, G. 2010. *Cell and Molecular Biology: Concepts and Experiments*. 6th Edition. John Wiley & Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. *Cell and Molecular Biology*. 8th edition. Lippincott Williams and Wilkins, Philadelphia.
3. Cooper, G.M. and Hausman, R.E. 2009. *The Cell: A Molecular Approach*. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
4. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009. *The World of the Cell*. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco
5. Verma, P. S., Agarwal, V. K. 1974. *Cell Biology, Genetics, Molecular Biology, Evolution and Ecology*. S. Chand & Company Ltd, New Delhi.
6. Veer Bala Rastogi. 2008. *Fundamentals of Molecular Biology*. Ane Books India.
7. C. B. Powar. Cell Biology, 2001. Himalaya Publishing, Mumbai.
8. P. S. Verma and V.K. Agarwal. 2004. *Cell Biology, Genetics, Molecular Biology, Evolution and Ecology*. S. Chand & Co. Ltd., New Delhi.
9. P. S. Verma and V.K. Agarwal. 2006. *Genetics*. S. Chand & Co. Ltd., New Delhi.
10. Monroe. W. Strickberger. 2001. *Genetics*. Prentice Hall India, New Delhi.
11. P.K. Gupta. 2000. *Genetics*. Rastogi Publications, Meerut.
12. P.C. Winter, G.I. Hickey & H.L. Fletcher. 2000. *Instant Notes in Genetics*. Viva Books Private Limited, New Delhi.

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

sushama

meghala

pramod

A. Subitha Devi

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

6. Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Global Development Needs	Cell being the structural & functional unit of life, with the knowledge of how cell functions and available molecular techniques, researchers will be able to create new vaccines, potent medicines, diagnose diseases and their cure.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Module I	Prepare a temporary slide of onion root tip and flower bud and observe different stages of mitosis and meiosis respectively
	Module III	Isolation of DNA from tomato
		Separation of DNA by Gel electrophoresis.

7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Experiential Learning	- Science Experiments and Field Trips - Live experiments like Meiosis from Onion bud - Visit to Scientific Institutes like CCMB, NIPHM, CRIUM - Interactive Class room games/Quiz - Kahoot or Edpuzzle
2.	Participative Learning	- Reading and Information Collection from Library - Group Discussion - Teams of three or four to discuss on Cell Division, DNA Structure, Protein Synthesis - Presentation Seminar topics on Plasma Membrane, Genome Organization. - D Models - creation and presentation
3.	Problem solving	Case Studies Relevant to the Course content from Science Journals

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

Subhame

meagha

Almar

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

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 – MCQ’s / Assignment	

Basanti

Head of the Department
St. Francis College,
Begumpet.

Subhane

M. J. J.

H. M.

A. S. R.

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

b) Model Question Paper – End Semester Exam Theory

CELL AND MOLECULAR BIOLOGY

Course Code: U24/ BOT/ DSE/601

Time: 2 Hours

Max. Marks: 60

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

Section A (Long Essay Type)

I. Answer all Questions

Marks 4 x 10 – 40

1. With the help of a neat diagram describe the autonomous organelles of a cell.

OR

2. Explain Mitosis in detail with significance.

3. Illustrate the method of DNA packaging in eukaryotes.

OR

4. What is Mutation and add a note on Mutant types.

5. Elaborate DNA replication in eukaryotes.

OR

6. Describe Hershey-Chase bacteriophage experiment and types of DNA.

7. Describe the structure of RNA and add a note on RNA polymerase.

OR

8. Explain in detail Lac operon concept.

Section B (Short Essay Type)II. Write short notes on any **FOUR** of the following:

Marks 4 x 5 - 20

9. Illustrate Fluid Mosaic Model.

10. Compare IS elements and Transposons.

11. Elaborate DNA Structure.

12. Explain Genetic code.

13. What is central dogma?

14. Assess the role of Peroxisomes.

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

Subhame

M. K. J.

M. K. J.

A. S. K. Rani

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

SECTION A - INTERNAL CHOICE				4Q X 10 M = 40 M
Question Number	Question	Question	CO	BTL (Blooms Taxonomy Level)
1	Module 1	With the help of a neat diagram describe the autonomous organelles of a cell.	CO 1	Level I, II
2	Module 1	Explain Mitosis in detail with significance.	CO 1	Level II
3	Module 2	Illustrate the method of DNA packaging in eukaryotes.	CO 2	Level II
4	Module 2	What is Mutation and add a note on Mutant types.	CO 2	Level I
5	Module 3	Elaborate DNA replication in eukaryotes.	CO 3	Level VI
6	Module 3	Describe Hershey-Chase bacteriophage experiment and types of DNA.	CO 3	Level I, II
7	Module 4	Describe the structure of RNA and add a note on RNA polymerase.	CO 4	Level I, II
8	Module 4	Explain in detail Lac operon concept.	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	Illustrate Fluid Mosaic Model.	CO 1	Level II
10	Module 2	Compare IS elements and Transposons.	CO 2	Level II
11	Module 3	Elaborate DNA Structure.	CO 3	Level VI
12	Module 4	Explain Genetic code.	CO 4	Level II
13	Module 4	What is central dogma?	CO 4	Level I
14	Module 1	Assess the role of Peroxisomes.	CO 1	Level V

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

Subhane

Megha

N. V. S. R.

A. S. V. R.

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

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	1,2,4,5,6	Understanding	15
2	1,2,4,5,6	Understanding	15
3	1,2,4,5,6,7	Understanding	15
4	1,2,4,5,6,7	Understanding	15

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

Sudhame

Prasanna *H. N. N. N.*

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

CELL AND MOLECULAR BIOLOGY

Practical Syllabus

1. Course Description

Programme:	B. Sc	Max. Hours:	30
Course Code:	U24/ BOT/ DSE/601/P	Hours per week:	2
Type of Course:	DSE - 3	Max. Marks:	50
No. of Credits:	1		

2. Course Objectives

1. To examine the structure of plant cell and different cell division stages.
2. To describe the process involved in isolation and separation of DNA.

3. Course Outcomes

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

CO 1: Develop basic skills to make cytological preparations and identification of various stages of cell division

CO 2: Devise methods to improve skills and techniques in the field of molecular biology

4. Course Content

1. To study prokaryotic (bacteria), viruses, eukaryotic cells with the help of light and electron micrographs.
2. Study of the photomicrographs of cell organelles.
3. To study the structure of plant cell through temporary mounts.
4. Study of mitosis in onion root tips (temporary mounts and permanent slides).
5. Study of meiosis in any flower bud/anther.
6. Isolation of DNA.
7. Preparation of the karyotype and ideogram from given photograph of somatic metaphase chromosome.
8. Separation of DNA by Gel electrophoresis.

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

Sudhame

M. K. Jyoti

K. Mani

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

5. Model Question Paper – End Semester Exam Practical

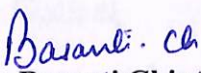
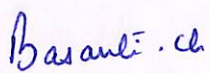
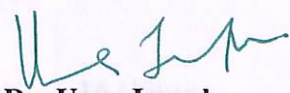
CELL AND MOLECULAR BIOLOGY

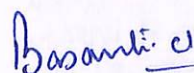
Course Code: U24/ BOT/ DSE/601/P

Time: 2 Hours

Maximum Marks: 50

- Q I. Carry out the cytological preparation and staining of the given material 'A' and report Any **TWO** stages of cell division to the Examiners.
Scheme for valuation: (Procedure – 4 marks; Slide preparation – 3 marks; Observation or recording of results (figures) - 3 marks). **10 Marks**
- Q II. Conduct the experiment 'B' allotted to you and writes the procedure.
Scheme for valuation: (Preparation – 2marks; Procedure - 3 marks) **5 Marks**
- Q III. Critical notes on Three spotter's 'C', 'D', 'E'.
Scheme for valuation: (Identification-1 mark; Notes for each spotter-4). **3x5 – 15Marks**
- Q IV. Project **10 marks**
- Q V. Viva-voce **5 marks**
- Q VI. Record. **5 marks**

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


Head of the Department
St. Francis College,
Begumpet.








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

SEMESTER VI

ECONOMIC BOTANY AND BIOTECHNOLOGY

1. Course Description

Program:	B. Sc	Max. Hours:	60
Course Code:	U24/ BOT/ DSE/602	Hours per week:	4
Type of Course:	DSE - 4	Max. Marks:	60
No. of Credits:	4		

2. Course Objectives

1. Evaluate how plants and plant products impact the world economy, with emphasis on those plants and plant products that substantially impact the economy.
2. Provide students with an understanding of the subject specific knowledge, as well as the critical, analytical and flexible approach to problem solving in the field of biotechnology

3. Course Outcomes

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

- CO1: Recognise the role plants play in human welfare with special emphasis on economic and commercially significant plants
- CO2: Categorize and demonstrate the principle and basic protocols for Plant Tissue Culture and its applications
- CO3: Interpret plant biotechnology practices such as hairy root culture alongside secondary metabolite production and rDNA technology
- CO4: Recognize the various gene transfer methods and implement the concepts and practices of intellectual property rights

4. Course Content

Module I: Plant products

15 Hours

- 1.1 Concept of centers of origin, their importance with reference to Vavilov's work; Cereals: Wheat - Origin, morphology, uses. Legume: General account with special reference to Gram and soybean.
- 1.2 Spices and Beverages: General account with special reference to clove and black pepper (Botanical name, family, part used morphology and uses). Tea (morphology, Processing, uses).
- 1.3 General description with special reference to groundnut and Cotton. (Botanical name, family, part used, morphology and uses)

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

Sushama

M. Raju

Ilumath

A. Suman Reddy

Module II: Tissue culture**16 Hours**

- 2.1 Tissue culture: Introduction, sterilization procedures, explants, culture media – composition and preparation; Micropropagation.
- 2.2 Organ culture: Vegetative Organs-Root, Shoot, Leaf culture Reproductive Organs - Anther, Embryo culture; Cell and protoplast culture, Somatic hybrids and Cybrids.
- 2.3 Applications of tissue culture: Production of pathogen free plants and somaclonal variants, production of stress resistance plants, secondary metabolites and synthetic seeds.

Module III: Biotechnology**12 Hours**

- 3.1 Production of hairy roots and its applications in production of secondary metabolites.
- 3.2 Biotechnology: Introduction, history, scope and applications. rDNA technology: Basic aspect of gene cloning, Enzymes used in gene cloning.
- 3.3 Gene Cloning -Vectors – cloning vehicles (Plasmid, Cosmids, Bacteriophages, & Phasmids); application of r DNA technology. Gene Libraries: Genomic Libraries, cDNA Libraries

Module IV: Techniques**17 Hours**

- 4.1 Polymerase chain reaction and its applications; Method of gene transfer in plants (*Agrobacterium* and Microprojectile); Production of transgenic plants, Bt –application in cotton and brinjal. Application of Transgenic in crop improvement.
- 4.2 Chromatography – Principle, Paper & Column chromatography; Electrophoresis – PAGE, SDS – PAGE.
- 4.3 Spectrophotometry – Principle & applications

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

Sushama

Megha

Sumit

A. Smita Bai

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

5. Reference Books

1. Kochhar, S.L. (2011). *Economic Botany in the Tropics*, MacMillan Publishers India Ltd., New Delhi. 4th edition.
2. Ashok Bendre and Ashok Kumar, 2000. *Economic Botany*, Rastogi Publications, U.P.
3. Bhojwani, S.S. and Razdan, M.K., (1996). *Plant Tissue Culture: Theory and Practice*. Elsevier Science Amsterdam. The Netherlands.
4. Balasubramanian, D., C. F. A. Bryce, K. Dharmalingam, J. Green and K. Jayaraman. 2004. *Biotechnology*. Universities Press (India) Private Limited, Hyderabad.
5. Channarayappa. 2007. *Molecular Biotechnology – Principles and Practices*. Universities Press (India) Private Limited, Hyderabad.
6. Chawala, H. S. 2002. *Introduction to Plant Biotechnology*. Oxford & IBH Publishing Company, New Delhi.
7. Dubey, R. C. 2001. *A Textbook of Biotechnology*. S. Chand & Company Ltd., New Delhi.
8. Edmond J. B., T. L. Senn, F. S. Adreus and R. J. Halfacre. 1977.
9. Jha, T.B. and B. Ghosh. 2005. *Plant Tissue Culture – Basic and Applied*. Universities Press (India) Private Limited, Hyderabad.
10. P.K Gupta, 2019. *Elements of Biotechnology*. Rastogi Publications, U.P.
11. Verma V, 1974. *A Textbook of Economic Botany*. Emkay Publications, Delhi.
12. Plummer, D.T. (1996). *An Introduction to Practical Biochemistry*. Tata McGraw- Hill Publishing Co. Ltd. New Delhi. 3rd edition.
13. Ruzin, S.E. (1999). *Plant Microtechnique and Microscopy*, Oxford University Press, New York. U.S.A.
14. Ausubel, F., Brent, R., Kingston, R. E., Moore, D.D., Seidman, J.G., Smith, J.A., Struhl, K. (1995). *Short Protocols in Molecular Biology*. John Wiley & Sons. 3rd edition.

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

Sushama

Meghita

Ram

A. Sankar Rani

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

6. Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Global needs	Integration of economic botany and biotechnology, can harness the potential of plant resources for socioeconomic development through technological approach.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Module II: Tissue culture	Hands on training sessions on culturing explants in suitable plant growth medium
	Module IV: Techniques	Understand the essentials of new techniques like electrophoresis, chromatography, spectrophotometry for research activities,

Basant
Head of the Department
St. Francis College
Begumpet.

Sushama *Megh*

Ilumina

A. Saritha Devi

7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Participative Learning	• Information collection from Library • Group Discussion Teams of three or four to discuss on plant tissue culture technique for crop improvement Presentation • Seminar topics on Transgenic Plants and IPR. • 3 D Models - creation and presentation
2.	Experiential Learning	• Science Experiments and Field Trips • Live experiments like Plasmolysis, tissue Culture Media, Gel Electrophoresis (Interdepartmental Activity) • Visit to Scientific Institutes like NIRD and Agribiotech • Interactive Class room games/Quiz Using Kahoot.
3.	Problem solving	• Minor research projects using the mentioned techniques in the syllabus.

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

Subhame

Megha

K. Manu

A. Subitha Rani
 CO-ORDINATOR
 B.O.S. IN BOTANY
 OSMANIA UNIVERSITY
 HYDERABAD-500 007

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	

Basant E. d
 Head of the Department
 St. Francis College,
 Begumpet.

Suzhame

Mr. J. S. Reddy

K. S. Reddy

A. S. Reddy

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

b) Model Question Paper – End Semester Exam Theory

ECONOMIC BOTANY AND BIOTECHNOLOGY

Course Code: U24/ BOT/ DSE/602

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: 4x 10 - 40 M

1. Explain the economic value of spices - clove and pepper.
OR
2. Elaborate the role of oil yielding plants with example of groundnut.
3. Describe Anther culture and its application.
OR
4. List the techniques in plant Tissue culture.
5. Illustrate the procedure of r-DNA technology.
OR
6. Assess the role of cloning vehicles.
7. Explain PCR and its applications.
OR
8. What are transgenic plants? Describe the application of transgenics in crop improvement.

Section B (Short Essay Type)II. Write short notes on any **FOUR** of the following:

Marks 4 x 5 - 20

9. Explain the economic importance of Cotton.
10. What are Somatic hybrids?
11. List the types of Restriction enzymes
12. Elaborate the method of Gel electrophoresis
13. List the economic uses of Wheat
14. What are Synthetic seeds? Explain their applications

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

Subhane

Aravind

Ilumina

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

SECTION A - INTERNAL CHOICE				4Q X 10 M = 40 M
Question Number	Question	Question	CO	BTL (Blooms Taxonomy Level)
1	Module 1	Explain the economic value of spices - clove and pepper	CO 1	Level II
2	Module 1	Elaborate the role of oil yielding plants with example of groundnut.	CO 1	Level VI
3	Module 2	Describe Anther culture and its application.	CO 2	Level I, II
4	Module 2	List the techniques in plant Tissue culture.	CO 2	Level I, IV
5	Module 3	Illustrate the procedure of r-DNA technology.	CO 3	Level II
6	Module 3	Assess the role of cloning vehicles	CO 3	Level V
7	Module 4	Explain PCR and its applications.	CO 4	Level II
8	Module 4	What are transgenic plants? Describe the application of transgenics in crop improvement.	CO 4	Level I
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 economic importance of Cotton.	CO 1	Level II
10	Module 2	What are Somatic hybrids?	CO 2	Level I
11	Module 3	List the types of Restriction enzymes	CO 3	Level I, IV
12	Module 4	Elaborate the method of Gel electrophoresis	CO 4	Level VI
13	Module 4	List the economic uses of Wheat	CO 4	Level I, IV
14	Module 1	What are Synthetic seeds? Explain their applications	CO 1	Level I, II

Basanti. C

Head of the Department
St. Francis College,
Begumpet.

Sudhama

MR. Jyoti

R. Kumar

A. Sarojika Rao

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

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

9. CO-PO Mapping

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

Basanti. C

Head of the Department
St. Francis College,
Begumpet,

Sushama

Ilumina

A. Sankar Reddy

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

ECONOMIC BOTANY AND BIOTECHNOLOGY

Practical Syllabus

1. Course Description

Programme:	B. Sc	Max. Hours:	30
Course Code:	U24/ BOT/ DSE/602	Hours per week:	2
Type of Course:	DSE - 4	Max. Marks:	50
No. of Credits:	1		

2. Course Objectives

1. To identify and classify plants that are of economic importance
2. To summarize the concept of plant tissue culture techniques and gene cloning techniques for improved plant propagation.

3. Course Outcomes

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

CO1: Identify members of the major angiosperm families by observing their diagnostic features and economic importance

CO2: Devise methods to improve basic skills and techniques related to molecular biology

4. Course Content

1. Study of economically important plants: Wheat, Gram, Soybean, Black pepper.
2. Clove, Tea, Cotton, Groundnut through specimens, sections and microchemical tests.
3. Familiarization with basic equipment in tissue culture.
4. Isolation of plant DNA (Onion)
5. Production of synthetic seeds /Encapsulation of embryo.
6. Preparation of plant tissue culture medium.
7. Study of biotechnology products: Samples of antibiotics and vaccines; Photographs of transgenic plants Bt Cotton; Bt Brinjal.
8. Study through photographs: Anther culture, somatic embryogenesis, endosperm and Embryo culture; Micropropagation.

5. Model Question Paper – End Semester Exam Practical

ECONOMIC BOTANY AND BIOTECHNOLOGY

Course Code: U24/ BOT/ DSE/602/P

Time: 2 Hours

Maximum Marks: 50 Marks

Q I. Conduct the biotechnological experiment 'A' allotted to you and writes the procedure.

5 Marks

Q II. Carry out the microchemical test of the given material 'B' and 'C'. Identify, draw and describe.

2 x 5 – 10 Marks

Q III. Critical notes on three spotters

3 x 5 - 15 Marks

Q IV. Viva-voce

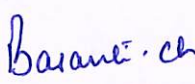
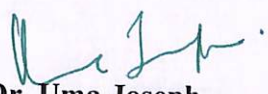
5 Marks

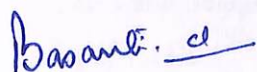
Q V. Project

10 Marks

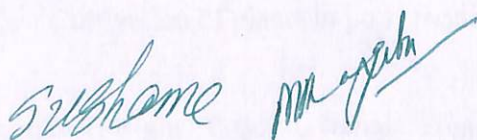
Q V. Record

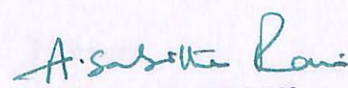
5 Marks

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



Head of the Department
 St. Francis College,
 Begumpet.





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

St. FRANCIS COLLEGE FOR WOMEN, BEGUMPET, HYDERABAD-500016
(An Autonomous College Affiliated To Osmania University)
FACULTY OF SCIENCE- DEPARTMENT OF CHEMISTRY
PRACTICAL SYLLABUS CBCS-2024

SEMESTER -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 K₂S₂O₈.

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.

Chairperson

Dept of Chemistry
Osmania University, Hyderabad

Head

Department of Chemistry
St. Francis College for Women
Hyderabad-500 007.

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	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.
EMP		
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 ICT, 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

		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)	


 Chairperson
 Board of Studies in Chemistry
 Dept of Chemistry
 Osmania University, Hyderabad,


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

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****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 $[\text{Cu}(\text{NH}_3)_4]$ 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 $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-OH}$ 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 Fluorescence and Phosphorescence ? Explain the phenomenon of fluorescence 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 $[\text{Co}(\text{NH}_3)_6]$ and $[\text{FeF}_6]^{3-}$ (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)


 Chairperson
 Board of Studies in Chemistry
 Dept of Chemistry
 Osmania University, Hyderabad


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

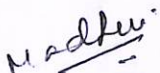
11. Describe the acid hydrolysis of octahedral complexes. (L2)
12. Define Hardy Schulze rule and Gold number. (L1)
13. Show how the molecular formula of a compound is determined based on its Mass spectrum? (L1)
14. List out the various types of NMR signals expected for 1,1,2-tribromoethane? What is the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


 Chairperson
 Board of Studies in Chem.
 Dept of Chemistry
 Osmania University, Hyderabad-500 007.


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

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****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 $[\text{Cu}(\text{NH}_3)_4]$ 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 $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-OH}$ 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 Fluorescence and Phosphorescence? Explain the phenomenon of fluorescence and phosphorescence using Jablonski diagram.	CO4	Level 2

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 $[\text{Co}(\text{NH}_3)_6]$ and $[\text{Fe}_6]^{3-}$	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

Skill Enhancement Course IV

FLORICULTURE

1. Course Description

Programme: B. Sc
 Course Code: U24/BOT/SEC/601
 Type of Course: SEC - 601
 No. of Credits: 2

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

2. Course objectives

1. Describe career opportunities in the floriculture industry
2. Explain the techniques in grading, bunching and shipping cut flowers in preparation for market and to practice procedures to increase life span of floral materials

3. Course Outcomes

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

- CO 1: Describe the gardening and nursery management methods and various ornamental plants and their cultivation methods.
- CO 2: Compare the principles of garden designs and understanding the importance of various landscaping methods and various factors affecting the flower production.

4. Course Content

Module I:

14 hours

- 1.1 Introduction: History of gardening; Importance and scope of floriculture and landscape gardening.
- 1.2 Garden Operations: Soil sterilization; Seed sowing; Pricking; Planting and transplanting; Shading; Stopping or pinching; Defoliation; Wintering; Mulching; Topiary; Role of plant growth regulators.
- 1.3 Ornamental Plants: Flowering annuals; Herbaceous perennials; Divine vines; Shade and ornamental trees; Ornamental bulbous and foliage plants; Cacti and succulents; Palms and Cycads; Ferns and Selaginellas; Cultivation of plants in pots; Indoor gardening; Bonsai.

Module II:

16 hours

- 2.1 Principles of Garden Designs: English, Italian, French, Persian, Mughal and Japanese gardens; Features of a garden (Garden wall, Fencing, Steps, Hedge, Edging, Lawn, Flower beds, Shrubbery, Borders, Water Garden). Some Famous gardens of India.
- 2.2 Landscaping Places of Public Importance: Landscaping highways and educational institutions.

2.3 Commercial Floriculture: Factors affecting flower production; Production and packaging of cut flowers; Flower arrangements; Methods to prolong vase life; Cultivation of Important cut flowers (Carnation, Aster, Chrysanthemum, Dahlia, Gerbera, Gladiolous, Marigold, Rose, Lilium, Orchids). Diseases and Pests of Ornamental Plants.

6. Reference Books

1. Randhawa, G.S. and Mukhopadhyay, A. 1986. Floriculture in India. Allied Publishers.

7. Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Global Development Needs	The global demand for cut flowers is increasing, driving growth in the floriculture market. Favorable agricultural practices and technological advancements adopted by farmers enhance yield and profitability in commercial floriculture.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
ED	Module I	Enhances students' employability within florist occupations.
	Module II	Preparing students to cut and cultivate essential flowers like Carnations, Asters, Chrysanthemums, etc., enhances their employability in floriculture and related industries.

8. 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 local gardens and floriculture units.
3.	Problem solving	Minor research Projects like starting small gardens at home

9. 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	

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

Suzhame
MR. J. K. Reddy
Dr. M. R. Reddy
A. S. S. Reddy
 CHAIRPERSON
 B.O.S. IN BOTANY
 OSMANIA UNIVERSITY
 HYDERABAD-500 007

b) Model Question Paper – End Semester Exam Theory

FLORICULTURE

Course Code: U24/ BOT/ SEC/601

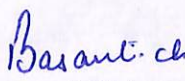
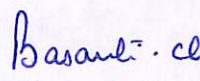
Max. Marks: 30

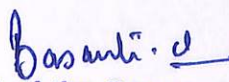
Time: 1 Hour

Answer any FIVE of the following

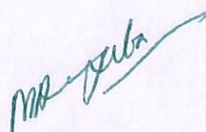
5 x 6 – 30

1. Describe the importance and scope of floriculture.
2. Explain the method of soil sterilization.
3. Discuss the role of plant growth regulators.
4. Explain about ornamental plants.
5. Describe the method of cultivation of indoor plants.
6. Describe some of the famous gardens of India.
7. Explain the factors affecting flower production.
8. Discuss on pest and disease management of ornamental plants.

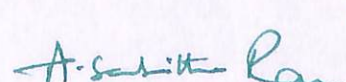
Prepared by	Checked & verified by	Approved by
 Dr. Basanti Chintapalli Teaching faculty	 Dr. Basanti Chintapalli HoD	 Dr. Uma Joseph Principal


 Head of the Department
 St. Francis College,
 Begumpet,


 Subhame


 M. S. Srinivas


 K. Srinivas


 A. Srinivas

CHAIRPERSON
 B.O.S. IN BOTANY
 OSMANIA UNIVERSITY
 HYDERABAD

ST.FRANCIS DEGREE COLLEGE FOR WOMEN BEGUMPET
HYDERABAD-500016
(AN AUTONOMOUS COLLEGE OF OSMANIA UNIVERSITY)
DEPARTMENT OF NUTRITION

DSE-3	FOOD SAFETY AND QUALITY CONTROL SEMESTER- VI	60 HRS
Module 1 - Food handling and public health Module 2 - Food packaging and labeling Module 3 - Food adulteration Module 4 - Food spoilage and preservation		

- The syllabus contains four Modules. Paper should give equal weightage to all Modules. Four long questions- One question per module with internal choice

SEMESTER - VI

FOOD SAFETY AND QUALITY CONTROL

1. Course Description

Programme: B.Sc.

Course Code: U24/NUT/DSE/601

Course Type: DSE -3

No. of credits: 4

Max. Hours: 60

Hours per week:3

Max. Marks:100

2. Course Objectives

- To emphasize on the importance of food safety, food quality and food laws and regulations
- Enables the students in application of basic aspects of food safety and quality assurance in quality surveillance system

3. Course Outcomes

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

CO1: Acquaint the students with protocols for safe handling of foods, water and was management.

CO 2: Recognise the role of food packaging and Nutrition labelling.

CO 3: Analyze consequences of food poisoning and infection on the health of individuals

CO 4: Interpret the knowledge of basic principles and methods in food preservation.

4. Course Content

MODULE I: FOOD HANDLING AND PUBLIC HEALTH

(15 Hrs)

1.1. Food Hygiene and Handling: Introduction, Definition, Basic aspects of Personal Hygiene, Importance of personal hygiene of the food handler, Disease transmission, Preventing food borne illnesses.

1.2. Food Institutions: Sanitation of food Institutions & pest control

1.3. Water & Waste Management: Composition of waste water, process of water purification, disposal of waste water, Types of wastes, Solid wastes, liquid wastes, gaseous wastes and disposal.

MODULE II: FOOD PACKAGING AND LABELING

(15 Hrs)

2.1 Food Packaging: Definition, Functions, Classification of packaging materials, Laws related to packaging.

2.2 Food and Nutrition Labeling: Standards, purpose, description types of labels, Components of labeling, mandatory labeling provision. Role of FSSAI in labeling.

2.3. Standards for health claims: Marketing and Regulatory issues, Regulatory bodies in India.

MODULE III: FOOD ADULTERATION

(15 Hrs)

3.1. Food Adulteration and Laws: Definition, Purpose, Types and methods of adulteration. Detection of food adulterants, Role of FSSAI

3.2. Food Standardization and Regulation Agencies in India- Framework of National food control system, Role of State and Central level Agencies. Institutes and Labs for testing food samples.

3.3 HACCP - Objectives, Principles and Process. Role and duties of food inspector .

MODULE IV: FOOD SPOILAGE AND PRESERVATION

(15 Hrs)

4.1 Food Spoilage: Physical, chemical and microbiological spoilage of foods.

4.2. Food Borne Intoxication & Infections: Food poisoning – Staphylococcus, Botulism, Salmonellosis, Cholera and Typhoid

4.3 Food Preservation: Methods of preservation, General principles and applications of Food preservation. Preservation by using temperature, Preservation using drying method, . Preservation using Class I and Class II preservatives, Preservation using radiation.

5. References

1. Kiron Prabhakar. A Practical guide to food laws and regulations. 1st Ed. Bloomsbury.
2. Sunetra Roday (2017). Food hygiene and sanitation. 2nd Ed. McGraw Hill Publications
3. Pulkit Mathur (2018). Food Safety and Quality Control (2018).
4. William C. Frazier, Dennis C. Westhoff, N.M. Vanitha Food Microbiology, 5th Edition McGraw Hill Education.

6. Syllabus Focus

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

Local /Regional/National / Global Development Needs	Relevance
Global Development Needs	Practicing food hygiene and sanitation plays an important role in public health.
Global Development Needs	Recognising the role of different preservative techniques and enhancing the shelf life of food stock addresses food security globally.

b. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
EMP	Module -3	Analysis of food adulterants and implementation of HACCP plays an important role in the food industry.
SD	Module -2	Development of food labels

7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Seminar Presentation	Participative Learning
2.	Quiz	Experiential Learning
3.	Group Discussion	Participative Learning

8. Course Assessment Plan**a. Weightage of Marks in Continuous Internal Assessments and End Semester Examination**

COs	Continuous Internal Assessments - CIA (40%)	End Semester Examination - (60%)
CO1	CIA-1	Written examination
CO2	CIA-1	
C03	CIA-2 Canteen survey	
C04	CIA-2 Skill test (written/quiz)	

a) Model Question paper pattern

SECTION A - INTERNAL CHOICE				5 Q X 10 M = 50 M
Question Number	Question	Question	CO	BTL(Blooms Taxonomy Level)
1	Module 1	Give an account of the basic aspects of personal hygiene and its importance.	CO 1	I
2	Module 1	Write note on the various methods used in disposal of solid waste.	CO 1	I
3	Module 2	Illustrate about the recent advances in packaging materials in food packing.	CO 2	II
4	Module 2	Explain in brief about the standards and various types of food labels.	CO 2	II
5	Module 3	List out the points put forth by PFA according to which an article is considered adulterated.	CO 3	I
6	Module 3	Explain food borne illness with suitable examples.	CO 3	II
7	Module 4	Explain the preservation of food by high temperature.	CO 4	II
8	Module 4	What are the various methods of drying involved in preservation of food	CO 4	I
SECTION B - ANSWER ANY 5 OUT OF 7 (To compulsorily have ONE question from each module)				5 Q X 2 M = 10 M
11	Module 1	Illustrate Waste disposal	CO 1	II
12	Module 2	Define Nutritional labeling	CO 2	I
13	Module 3	Describe PFA	CO 3	II
14	Module 4	Explain Botulism	CO 4	II
16	Module 4	List the role of Personal hygiene	CO 4	I
17	Module 4	Explain Packaging laws	CO 4	II

**FOOD SAFETY AND QUALITY CONTROL
PRACTICAL**

Programme: B.Sc.
Course Code: U24/NUT/DSE/601 /P
Course Type: DSE 3
No. of credits: 1

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

COURSE OBJECTIVES:

- To identify common food adulterants
- Preparations of home made preserved foods, using different home scale preservation methods.

Course Outcomes:

- Understand the role of food packaging and Nutrition labeling.
- Learn the preparation methods of homemade preserved foods.

PRACTICAL SESSIONS

1. Food Preservation
 - a. Preparation of Jams
 - b. Preparation of Jellies.
 - c. Preparation of Sauces.
 - d. Preparation of Squashes
 - e. Preparation of Pickles
2. Food Adulteration Tests
 - a. Cereal and cereal products
 - b. Pulses
 - c. Milk and milk products
 - d. Fats and oils
 - e. Spices and condiments
 - f. Sugar
 - g. Beverages
3. Food labeling- Guidance on understanding of various aspects of Nutrition labeling.
4. Food Microbiology- study of different disease causing organisms.

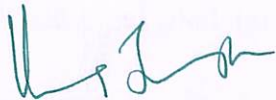
MODEL QUESTION PAPER
FOOD SAFETY QUALITY CONTROL
PRACTICAL

Course Code: U20/NUT/DSE /603/P
Course Credit:1

Marks: 50 Marks
Time: 2 Hrs

Answer the following

1. Identify the given spot and write the points of identification: 5 x 5 = 25 M
 A - E
2. Identify the adulterants in the given food samples 4 x 5 = 20 M
3. Record 5 M

Prepared by	Checked & Verified by	Approved by
 Ms Inda Bhargavi Signature of the teaching faculty	 Ms. Tabitha Ramona Name and Signature of HoD	 Dr. Uma Joseph Name and Signature of Principal

ST.FRANCIS DEGREE COLLEGE FOR WOMEN BEGUMPET
HYDERABAD-500016
(AN AUTONOMOUS COLLEGE OF OSMANIA UNIVERSITY)
DEPARTMENT OF NUTRITION

SEC-4	FOOD SERVICE MANAGEMENT SEMESTER- VI	30 HRS
Module 1 - Quantity Food Production Module 2 - Planning different courses of meal		

- The syllabus contains two Modules. Paper should give equal weightage to all Modules. Five short questions with internal choice

SEMESTER - VI

FOOD SERVICE MANAGEMENT

1. Course Description**Programme: B.Sc****Course Code: U24/NUT/SEC/601****Course Type: SEC -4****No. of credits: 2****Max. Hours: 30****Hours per week: 2****Max. Marks: 50****2. Course Objectives**

- To gain knowledge on different types of food service layouts.
- To plan and prepare different types of menus for food production.

3. Course Outcomes

This SEC paper will help students to enhance their overall skills and in Course Content

- Acquire knowledge of the different types of food service styles and to apply the skills in menu planning for the food service Modules.
- Acquire skill in cost concepts in the food industries.

4. Course Content

MODULE I: QUANTITY FOOD PRODUCTION

(15 Hrs)

1.1. Food Production Process: Food purchase, receiving and storage standards for selection of fresh food, substitutes - convenience or ready prepared food.

1.2. Menu planning: Importance of menu, Factors affecting menu planning, Types of menu-Table d'hôte menu, A' la carte menu

1.3. Planning of a Small Food Service Unit and types of Services: Planning the set up- Identifying resources, Developing Project plan, Determining investments, 5 types of service – Table service, assisted service, self service, single point service, specialized service.

MODULE II: PLANNING DIFFERENT COURSES OF MEAL

(15 Hrs)

1. Table Setting, Napkin folding.
2. Appetizer- Tomato Soup, Sweet Corn Soup
3. Starter- Vegetable Cutlet
4. Main Course- Chinese Fried Rice
5. Snacks -Sandwich
6. Dessert - Custard, Carrot Halwa

5. References

1. Food & Beverage - Service and Management by Bobby George (Author), Sandeep Chatterjee, Institutional Food Management by Mohini Sethi .
2. Catering management by Mohini Sethi.
3. Andrews S, Food and Beverage Service: Training Manual, 2nd edition, New Delhi, Tata McGraw Hill, 2017.
4. Bessie Brooks West and Levelle Wood MS, Food Service in Institutions ,6th edition, John MacMillan Publishing Co, 1988.
5. Fuller J and Thomas S, Modern Restaurant Service, 4th edition, Copp Clark Pitman , 1983
6. Harris N, Meal management ,6th edition, New York, Mac Millan, 1984.
7. Kotas R, Accounting in hotel and catering industry, 4th edition Cengage Learning EMEA, 1981.
8. Kotler P and Keller K, Marketing Management , 16th edition, Pearson Education, 2022.
9. Roday S, Food Hygiene and Sanitation –Tata McGraw Hill Publishing Co. Ltd., 3rd reprint

6. Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Local	Planning standardized recipes for the food service unit.

b) Components on Skill Development/Entrepreneurship Development/ Employability

SD/ED/EMP	Syllabus Content	Description of Activity
ED	2	Preparation of Standardized recipes in the food service unit.

7. Course Assessment Plan

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

Formative Assessment - FA (40)	Summative Assessment - SA (60)
CIA-20 marks Fill in the blanks/ MCQ/ Crossword	End Semester exam-30 Marks

b) Model Question Paper- End Semester Exam

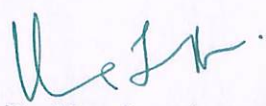
**FOOD SERVICE MANAGEMENT
MODEL QUESTION PAPER
THEORY**

Course Code: U24/NUT/SEC/601
Credits: 3

Max Marks: 30
Time: 1 Hrs

I. Answer any five of the following**5x6 = 30M**

1. Describe the different types of Menus in a catering industry.
2. Factors affecting menu planning.
3. Developing a project plan
4. A' la carte menu
5. Importance of Menu
6. Assisted service
7. Standards for the selection of fresh foods
8. Table d'hote menu

Prepared by	Checked & Verified by	Approved by
 Ms Indu Bhargavi Signature of the teaching faculty	 Ms. Tabitha Ramona Name and Signature of HoD	 Dr. Uma Joseph Name and Signature of Principal

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.


Chairperson
Board of Studies in Chemistry
Dept of Chemistry
Osmania University, Hyderabad.

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


 Chairperson
 Board of Studies in Chemistry
 Dept of Chemistry
 Osmania University, Hyderabad

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.


 Chairperson
 Board of Studies in Chem
 Dept of Chemistry
 Osmania University, Hyd-07.

b) Question Paper Pattern

**St. FRANCIS COLLEGE FOR WOMEN BEGUMPET HYDERABAD – 500
016 (AN AUTONOMOUS COLLEGE AFFILIATED TO OSMANIA
UNIVERSITY) CHEMISTRY**

Model Paper

B.Sc. III - Semester VI

SKILL ENHANCEMENT COURSE

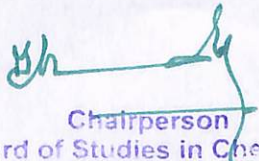
MATERIAL SCIENCES AND CATALYSIS

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)


Chairperson
Board of Studies in Chemistry
Dept of Chemistry
Osmania University, Hyd-07.

ST.FRANCIS DEGREE COLLEGE FOR WOMEN BEGUMPET
HYDERABAD-500016
(AN AUTONOMOUS COLLEGE OF OSMANIA UNIVERSITY)
DEPARTMENT OF NUTRITION

DSE-IV	NUTRITION THERAPY IN CRITICAL CONDITIONS SEMESTER- VI	60 HRS
Module 1 - Advance Nutritional Care Module 2 - Diet in Degenerative diseases Module 3 - Diet in Renal disease Module 4 - Diet in diseases of liver, gallbladder, pancreas - Malabsorption Syndrome		

- The syllabus contains four Modules. Paper should give equal weightage to all Modules. Four long questions- One question per module with internal choice

SEMESTER - VI

NUTRITION THERAPY IN CRITICAL CONDITIONS

1. Course Description

Programme : B.Sc.

Course Code : U24/NUT/DSE/602

Course Type : DSE- 4

No. of credits : 4

Max. Hours : 60

Hours per week : 3

Max. Marks : 100

2. Course Objectives

- To obtain knowledge on the role of diet in various disease conditions.
- Students are able to understand Principles of Diet therapy, modifications of normal diet for therapeutic purposes, and Role of a Dietitian.

3. Course Outcomes

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

CO 1: Understand the various kinds of diets in a hospital and dietary management in gastrointestinal disorders

CO 2: To determine the etiology, risk factors, clinical features and dietary management in degenerative disorders.

CO 3: Emphasis on nutrition modification in critical conditions such as renal failure and dialysis.

CO 4: Acquire knowledge with respect to the physiology and the dietary intervention in cardiac and liver disorders.

4. Course Content

MODULE 1 - ADVANCE NUTRITIONAL CARE

(15 hrs)

1.1 Surgical procedures: CABG, Pre & post-operative care, Nutritional assessment of critically ill patients.

1.2 Diet in gastritis: symptoms of gastritis, dietary management

1.3 Burns: Degree of burns, fluid & electrolyte replacement & dietary management

MODULE 2 - DIET IN DEGENERATIVE DISEASES

(15 hrs)

2.1 Cancer- Definition, types, cancer therapy, & dietary management of cancer patients.

2.2 Hyperlipidemia & congestive heart failure: Etiology, symptoms & dietary management.

2.3 Respiratory Disorders: Pneumonia, COPD

MODULE 3: DIET IN RENAL DISEASE

(15 hrs)

3.1 Diet in renal disorders: Causes, symptoms & dietary treatment in ARF, CRF. Types of dialysis, renal calculi- types & dietary management.

3.2 Gout causes, symptoms & diet

MODULE 4 : DIET IN DISEASES OF LIVER, GALLBLADDER, PANCREAS - MALABSORPTION SYNDROME

(15 hrs)

4.1 Liver disorders - Hepatic coma, Cholelithiasis, cholecystitis & pancreatitis.

4.2 Diet in disturbance of small intestine & colon: sprue, coeliac disease, & disaccharide Intolerance- symptoms & dietary management

5. References

1. Sri Lakshmi.B - Dictetics, New Age International Publishers.
2. Antia FP. Clinical dietetics and Nutrition, 2nd Edition, Oxford University Press, Delhi.
Swaminathan- Advance textbook in Food & Nutrition Volume II, the Bangalore printing and publishing company.
3. Krause M, Katheleen. L Mahan and Sylvia Escott Stump, Food, Nutrition, & Diet Therapy. 11 edition WB Saunders Company, Philadelphia, 2004
4. Joshi AS. Nutrition & Dietetics 2010, Tata Mc. Graw Hill.
5. Robinson C. H. Lawler M. R., Chenoweth W. L. & Garwick A E., Normal and Therapeutic Nutrition, Mc Millan Publishing Company.
6. Modern Nutrition In Health And Disease by Maurice E. Shils, Moshe Shike, A.
7. Catharine Ross, Lippincott William and Wilkins publications
8. Sue Rodwell Williams, Nutrition and Diet therapy, Times Mirror/ Mosby, College Publishing st. Louis.
9. Kumud Khanna, textbook of nutrition and dietetics, phoenix publishing house, Pvt Ltd. New Delhi
10. Guyton & Hall- textbook of medical physiology, 9th edition, W.B saunders & co. Burtis G., Davis J. and Martin S. Applied Nutrition and Diet Therapy, W.B. Saunders Co.

6. Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Global	To identify different causative agents in disease conditions and their modification through diet.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
EMP	1, 2,3,&4	Planning diets for various non communicable and communicable diseases for hospitalized patients.

7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Seminar Presentation	Participative Learning
2.	Quiz	Experiential Learning
3.	Group Discussion	Participative Learning

8. Course Assessment Plan

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

COs	Continuous Internal Assessments - CIA (40%)	End Semester Examination - (60%)
CO1	CIA-1	Written examination
CO2	CIA-1	
CO3	CIA-2 Flashcards	
CO4	CIA-2 Skill test (written/quiz)	

a) Model Question paper pattern

SECTION A - INTERNAL CHOICE				5 Q X 10 M = 50 M
Question Number	Question	Question	CO	BTL(Blooms Taxonomy Level)
1	Module 1	Give an account on the symptoms, causes and role of nutrition in management of gastritis	CO 1	I
2	Module 1	Explain in detail the assessment of nutritional status of critically ill patients.	CO 1	II
3	Module 2	Illustrate in detail the dietary management in cancer patients with special reference to functional foods.	CO 2	II
4	Module 2	Explain the process of hyperlipidemia and role of fats in the development of the same.	CO 2	II
5	Module 3	Explain the etiology, symptoms & dietary management in ARF.	CO 3	II
6	Module 3	Explain the symptoms, causes and role of nutrition in management of Gout	CO 3	II
7	Module 4	Explain the correlation between the coeliac disease and dietary fiber	CO 4	II
8	Module 4	What are the symptoms, causes and role of nutrition in management of in liver cirrhosis	CO 4	I
SECTION B - ANSWER ANY 5 OUT OF 7 (To compulsorily have ONE question from each module)				5 Q X 2 M = 10 M
11	Module 1	Explain Post operative care	CO 1	II
12	Module 2	Define Fluid and electrolyte replacement in burns Nutritional labeling	CO 2	I
13	Module 3	Describe COPD	CO 3	II
14	Module 4	Explain Heart failure	CO 4	II
16	Module 4	Explain Renal Calculi	CO 4	II
17	Module 4	Explain Pancreatitis	CO 4	II

**NUTRITION THERAPY IN CRITICAL CONDITIONS
PRACTICAL**

Programme: B.Sc.
Course Code: U24/NUT/DSE /602/P
Course Type: DSE 4
No. of credits: 1

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

Course Objectives:

- To plan days diet for different health conditions
- Preparations of modified diets

Course Outcomes:

- Apply concepts of therapeutic condition to plan and calculate nutritive value
- Create and prepare a menu based on various dietary disorders.

PRACTICAL SESSIONS

1. Planning and preparation of diets for Hyperlipidemia.
2. Planning and preparation of diets for Congestive Heart Failure.
3. Planning and preparation of diets for Acute Renal failure and Chronic Renal failure.
4. Planning and preparation of diets for patients with chronic renal failure undergoing
5. Dialysis.
6. Planning and preparation of diet for Renal calculi.
7. Planning and preparation of diets for Surgery

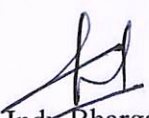
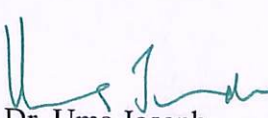
MODEL QUESTION PAPER PRACTICAL

Course Code: U24/NUT/DSE /602/P
Course Credit:1

Marks: 50 Marks
Time: 2 Hrs

Answer the following

1. Write the modified RDA for the given condition 05M
2. Plan A Day's Diet for The Given Condition 10M
 - a) Hyperlipidemia
 - b) Congestive Heart Failure
 - c) Acute Renal Failure
 - d) Chronic Renal Failure
 - e) Chronic Renal failure with dialysis
 - f) Renal Calculi
 - g) Surgery
3. Calculate The Any Two Nutrients of Importance & conclusion table 15M
4. Preparation of Selected Meal and Display 10M
5. Record 05 M

Prepared by	Checked & Verified by	Approved by
 Ms Indu Bhargavi Signature of the teaching faculty	 Ms. Tabitha Ramona Name and Signature of HoD	 Dr. Uma Joseph Name and Signature of Principal

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 T_g and T_m.
- 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 T_g and T_m.

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

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


Chairperson
Board of Studies in Chemistry
Dept of Chemistry
Osmania University, Hyd-07.

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.


Chairperson
Board of Studies in Chem
Dept of Chemist
Osmania University, Hyd-07

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.


 Chairperson
 Board of Studies in Chemistry
 Dept of Chemistry
 Osmania University, Hyd-07.

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


 Chairperson
 Board of Studies in Chem
 Dept of Chemistry
 Osmania University, Hyderabad.

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 T_g 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	CO 3	(Level II)
		OR		

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	CO 4	(Level II)
		OR		
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)

**SEMESTER – VI
PROJECT****1. Course Description**

Programme : B.Sc
Course Code : U24/NUT/PRJ/601/P
Course Type : Project
No. of credits : 4

Hours per week : 4
Max. Marks : 100

2. Course Objectives:

- To mentor the students to design and conduct an original and ethical research.

Course Outcomes

- Students will be able to plan, design and write a scientific report

1. Basic Concepts of Project Planning

- a) Defining objectives - Need, problem, project, feasibility, planning. Formulation, Identifying resources.
- b) Methods/approaches, Project Appraisal - Project Format

2. Guideline for Project Writing

- a) Title of the project
- b) Name of the person
- c) Duration of the project, type of project
- d) Aims and objectives - summary of the proposed project
- e) Project information, location, people and personnel involved
- f) Working/methodology
- g) Evaluation
- h) Writing and reporting

Reference: Latest APA manual for dissertation

Evaluation: Viva jointly by one internal and one external examiner

PROJECT WORK- REPORT WRITING AND PRESENTATION OF PROJECT SEMINAR**Internal Examination:**

In internal examination, 40 marks based on day-to-day work of the concerned student in terms of experimental designing. Practical performance based on the laboratory work, interpretation of the results obtained and regularity and any other criteria relevant to the study.

Presentation of the work in front of the faculty of the department at least, twice during this project work as follows.

- | | |
|---|------------|
| (1) Deciding of the project and state of the art presentation | 10M |
| (2) Discussion of the materials and methods and protocols | 10M |
| (3) Presentation of the obtained results | 10M |
| (4) Review of Literature | 10M |

External Examination

- (1) 60 marks examination of the dissertation examiners which includes viva-voce conducted by examiners.

Prepared by	Checked & Verified by	Approved by
 Ms. Indu Bhargavi Signature of the teaching faculty	 Ms. Tabitha Ramona Signature of HoD	 Dr. Uma Joseph Signature of Principal