

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.


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Dept of Chemistry
Osmania University, Hyd-07.


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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

30. Wahid.U.Malik, Tuli G.D and Madan R.D (1976) *Selected topics in Inorganic Chemistry*: S.Chand Publishers
- Puri B.R, Sharma L.Rand Khalia K.C (2014) *Principles of Inorganic Chemistry*: Milestone publishers and Distributers.
- Tuli G.D, Madan R.D, Basu S.K, Sathyaprakash. *Advanced Inorganic Chemistry Volume II*: S.Chand and company ltd (New Delhi ,India)
- Sharma, Y.R. *Text Book of Complete Organic Chemistry*, 2nd Edn. Kalyani, 2007.
- Jain, M.K. & Sharma, S.C. *Modern Organic Chemistry*, 4th Edn. Vishal, 2009.
- Sharma Y.R (2005) *Elementary Organic Spectroscopy; Principles and Chemical applications* : S.Chand & Company Ltd
- Puri, B.R., Sharma L.R., and Pathania, M.S. (2003). *Elements of Physical Chemistry*. Jalandhar, Delhi: Vishal Publishing Co.
- 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.

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

SEMESTER -VI

EXPERIMENTS IN PHYSICAL CHEMISTRY II AND INSTRUMENTATION

Program: B.Sc.

Course Code: U20/CHE/DSE/601/P

Course: DSE-3&4

No. of Credits : 1

Max. Hours: 30 Hrs

Max. Marks: 50

Hours per week: 3 Hrs

Course Objectives

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

Course Outcomes

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

Chemical Kinetics:

- 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.

105 DEPARTMENT OF CHEMISTRY, ST. FRANCIS COLLEGE FOR WOMEN, BEGUMPET, HYDERABAD-500016
 Osmania University, Hyderabad

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

7. Pedagogy

S. No.	Student Centric Methods Adopted	Type / Description of Activity
1.	Field trips	Students are taken to various institutes like 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.
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8. Course Assessment Plan

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

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


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b. Model Question Paper - End Semester Exam

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

- Describe the structure of $[\text{Cu}(\text{NH}_3)_4]$ using Valence bond theory. (CO1) L1 5M
 - Define optical isomerism? Draw and explain the optical isomerism in octahedral complexes. (CO1) L1 5M
- OR
- Summarise Werner's theory with examples. (CO1) L2 5M
 - Explain the Crystal field splitting in octahedral complexes. (CO1) L5 5M
- 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
- Define trans effect? Discuss the theories and applications of trans effect. (CO2) L2 5M
 - Distinguish labile and inert complexes? Explain with examples. (CO2) L4 5M
- What is the chemical shift? Explain the change in position of signals with examples. (CO3) L1 5M
 - Elaborate about (M+1), (M+2) and base peaks with two examples in Mass spectrometry. (CO3) L6 5M
- OR
- 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
 - Explain the basic principles of ESR spectroscopy. (CO3) L5 5M
- Classify the various types of colloids? (CO4) L5 5M
 - Deduce the expression for Langmuir adsorption isotherms. (CO4) L5 5M
- OR
- What are Fluorescence and Phosphorescence? Explain the phenomenon of fluorescence and phosphorescence using Jablonski diagram. 10M

SECTION – B (Short answer questions)

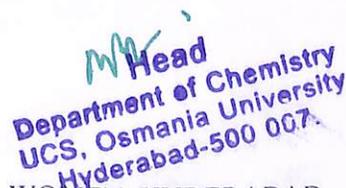
II. Answer any four questions.

4 X 5 = 20 Marks

- Explain the Job's method of determination of composition of a complex. (L2)
- What is EAN? Calculate the EAN for $[\text{Co}(\text{NH}_3)_6]$ and $[\text{FeF}_6]^{3-}$ (L1)
- Describe the acid hydrolysis of octahedral complexes. (L2)
- Define Hardy Schulze rule and Gold number. (L1)
- Show how the molecular formula of a compound is determined based on its Mass spectrum? (L1)
- Discuss the quantum yield for the photochemical combination of H_2 & Cl_2 to form HCl (L5)



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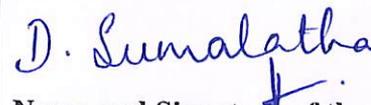
11. Describe the acid hydrolysis of octahedral complexes. (L2)
12. Define Hardy Schulze rule and Gold number. (L1)
13. Show how the molecular formula of a compound is determined based on its Mass spectrum? (L1)
14. List out the various types of NMR signals expected for 1,1,2-tribromoethane? What is the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

c. Question Paper Blueprint

Modules	Hours Allotted in the Syllabus	Cos Addressed	Section A (No. of Questions)	Total Marks	Section B (No. of Questions)	Total Marks
1	15	1	2	10	2	20
2	15	2	2	10	1	15
3	15	3	2	10	2	20
4	15	4	2	10	1	15

9. CO-PO Mapping

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

Prepared by	Checked & Verified by	Approved by
 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.
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b. Model Question Paper - End Semester Exam

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

(An Autonomous College Affiliated to Osmania University)

Faculty of Science – Department of Chemistry

B.SC. 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)			4 X 5M = 20 M	
ANSWER ANY 4 OUT OF 6				
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
CYBER SECURITY

1. Course Description:

Programme: B.Sc. Computer Science

Course Code: U24/CSC/SEC/601

Course Type: SKILL ENHANCEMENT COURSE

No. of credits: 2

Max. Hours: 30

Hours per week: 2

Max. Marks

2. Course Objectives:

- To learn the foundations of Cyber security and the threat landscape.
- To equip students with the technical knowledge and skills needed to protect and defend against cyber threats.
- To expose students to responsible use of online social media networks and digital payments.

3. Course Outcomes:

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

CO1: *Discuss* and *outline* cyber security and issues and challenges associated with it.

(Cognitive level – 2)

CO2: *Analyze* privacy and security concerns on online social media and various digital payment modes and related cyber security aspects. (Cognitive level – 4)


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4. Course Content:**MODULE I: INTRODUCTION TO CYBER SECURITY AND CYBER LAWS (15 Hrs)**

Defining Cyberspace, Architecture of cyberspace, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security; Classification of cyber-crimes, Common cyber-crimes, Reporting of cyber-crimes, Remedial and mitigation measures, Legal perspective of cyber-crime.

MODULE II: SOCIAL MEDIA AND DIGITAL PAYMENT SECURITY (15 Hrs)

Introduction to Social networks. Types of social media, Social media privacy, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Digital payments related common frauds and preventive measures.

5. References:

1. Cyber Crime Impact in the New Millennium, by R. C Mishra, Author Press. Edition 2010.
2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)
3. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson, 13th November, 2001)
4. Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd...
5. Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.



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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	Cybersecurity is crucial because it safeguards all types of data against theft and loss. It's essential for organizations and individuals to take measures to protect their information assets from potential attacks or leaks.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Modules 1 and 2	Develop a deeper understanding and familiarity with various types of cyberattacks, cyber crimes, vulnerabilities and remedies thereto. Analyse and evaluate the digital payment system security and remedial measures against digital payment frauds.

7. Course Assessment Plan:**a) Weightage of Marks in Formative and Summative Assessments**

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



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b) Question Paper Pattern

**EXTERNAL- MODEL QUESTION PAPER
PRACTICAL**

Course code: U24/CSC/SEC/601

Max Time: 1 Hr.

Credits:2

Max Marks: 30Marks

Answer the following.

1. Explain the architecture of cyberspace and classify the cyber-crimes.
2. Explain the following
 - a. Security issues related to social media
 - b. Unified Payment Interface (UPI)
 - c. e-Wallets

Prepared by	Checked & Verified by	Approved by
 Ms. Afeefa Noorain Teaching Faculty	 Ms. D. Sowjanya HOD	 Dr. Uma Joseph Principal



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

SEMESTER -VI

EXPERIMENTS IN PHYSICAL CHEMISTRY II AND INSTRUMENTATION

Program: B.Sc.

Course Code: U20/CHE/DSE/601/P

Course: DSE-3&4

No. of Credits : 1

Max. Hours: 30 Hrs

Max. Marks: 50

Hours per week: 3 Hrs

Course Objectives

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

Course Outcomes

CO1: Achieve the expertise in determining pH, conductivity, unknown concentration of solutions and rate constants of reactions.

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- Acid catalyzed hydrolysis of methyl acetate.
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- Determination of Dichromate and Permanganate in a mixture using Beer Lambert's Law.
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- Titration of strong acid Vs strong base.
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- Khosla, B. D.; Garg, V. C. & Gulati, A. *Senior Practical Physical Chemistry*, R. Chand & Co.: New Delhi (2011).
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b. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
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7. Pedagogy

S. No.	Student Centric Methods Adopted	Type / Description of Activity
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3.	Seminars/ workshops/ research projects	Students are allowed to participate in seminars and workshops organized in and

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8. Course Assessment Plan

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

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CO2	Skill Test 1 (10 M)	
CO3	CIA 1 written exam (10 M)	
CO4	Skill Test 2 (10 M)	


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b. Model Question Paper - End Semester Exam**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)

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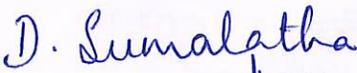
11. Describe the acid hydrolysis of octahedral complexes. (L2)
12. Define Hardy Schulze rule and Gold number. (L1)
13. Show how the molecular formula of a compound is determined based on its Mass spectrum? (L1)
14. List out the various types of NMR signals expected for 1,1,2-tribromoethane? What is the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

c. Question Paper Blueprint

Modules	Hours Allotted in the Syllabus	Cos Addressed	Section A (No. of Questions)	Total Marks	Section B (No. of Questions)	Total Marks
1	15	1	2	10	2	20
2	15	2	2	10	1	15
3	15	3	2	10	2	20
4	15	4	2	10	1	15

9. CO-PO Mapping

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

Prepared by	Checked & Verified by	Approved by
 Name and Signature of the teaching faculty Y. Lakshmi madhuri	 Name and Signature of the HoD Dr. D. Sumalatha	 Name and Signature of Principal Dr. Uma Joseph


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b. Model Question Paper - End Semester Exam

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

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SECTION B – (Short answer questions)			4 X 5M = 20 M	
ANSWER ANY 4 OUT OF 6				
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
INFORMATION SECURITY AND CYBER LAWS

1. Course Description:**Programme: B.Sc.****Course Code: U24/CAP/DSE/602****Course Type: DISCIPLINE SPECIFIC ELECTIVE****No. of credits: 4****Max. Hours: 60****Hours per week: 4****Max. Marks: 100****2. Course Objectives:**

- To learn the basics of Information Security, Anatomy of Information Security Attacks and their countermeasures.
- To learn the foundations of Cyber security and the threat landscape.
- To equip students with the technical knowledge and skills needed to protect and defend against cyber threats.
- To expose students to governance, regulatory, legal, economic, environmental, social and ethical contexts of security policies and cyber laws.

3. Course Outcomes:

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

CO1: *Illustrate* and *explain* the basic elements of computer networks and information security. (Cognitive level – 2)

CO2: *Develop* a deeper understanding and familiarity with various types of cyberattacks, cyber-crimes, vulnerabilities and remedies thereto. (Cognitive level - 5)

CO3: *Design* security mechanisms using rigorous approaches by key ciphers and create digital signatures (Cognitive level – 6)

CO4: *Analyse* the Legal and Policy Developments in Various Countries to Regulate Cyberspace. (Cognitive level – 4)



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4. Course Content:**MODULE I: INTRODUCTION TO INFORMATION SYSTEM AND SECURITY (15 Hrs)**

Introduction to Information System and Security: Computer Networks, Internet, Protocol, Network Core, Information System, Types of IS, Information Security, Need for Information Security, Information Assurance

MODULE II: INTRODUCTION TO CYBER SECURITY (15 HRS)

Introduction to Cyber Security: Overview of Cyber Security, Internet Governance – Challenges and Constraints, Cyber Threats: - Cyber Warfare-Cyber Crime-Cyber Terrorism-Cyber Espionage, need for a Comprehensive Cyber Security Policy, need for a Nodal Authority, Need for an International convention on Cyberspace. Cyber Security Vulnerabilities: Overview, vulnerabilities in software, System administration, Complex Network Architectures, Open Access to Organizational Data, Weak Authentication, Unprotected Broadband communications, Poor Cyber Security Awareness.

MODULE III: INTRODUCTION TO CRYPTOGRAPHY AND APPLICATIONS (15 HRS)

Introduction to Cryptography and Applications: Introduction to Application Security, Data Security Considerations, Security Technologies, Important terms, Threat, Flaw, vulnerability, Attack, Cipher, Private Key Cryptography, Substitution Cipher (Caesar), Transposition (Rail-Fence), Security Threats to E-Commerce, E-Cash and Electronic Payment System, Credit/Debit/Smart Cards, forensics, Digital Signature.

MODULE IV: INTRODUCTION TO SECURITY POLICIES AND CYBER LAWS (15 HRS)

Introduction to Security Policies and Cyber Laws: Need for an Information Security Policy, Information Security Standards – ISO, Introducing Various Security Policies and Their Review Process, Introduction to Indian Cyber law, Objective and Scope of the IT Act, 2008, Intellectual Property Issues, Overview of Intellectual-Property- Related Legislation in India, Patent, Copyright, Software License.


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5. References

1. Introduction to information security and cyber laws by Dr. Surya Prakash T, Ritendra G, Praveen Kumar S, KLSI, Dreamtech Publication, 1/E, 2014.
2. Security Engineering by S. Anderson, Ross, John Wiley & Sons, 2/E, 2008.
3. Network Security by G.R.F. Snyder, T. Pardoe, Cengage Learning, 2010.
4. Computer Security: Concepts, Issues and Implementation by Basta, W.Halton, 3/E, Cengage Learning, 2008.
5. Information Security: Principles and Practice by Mark S. Merkow, Jim Breithaupt, 2/E Edition, Pearson, 2014.

6. Syllabus Focus**a) Relevance to Local, Regional, National and Global Development Needs**

Local /Regional/National /Global Development Needs	Relevance
Global Development	Cyber laws play a pivotal role in protecting intellectual property rights in the vast digital domain. These laws prevent the unauthorized use and distribution of digital content, encouraging innovation and creativity by safeguarding the fruits of intellectual labour.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Modules 1 and 2	Understanding basic concepts like information systems and cyber security.
SD	Modules 3 and 4	Understanding the concepts like cryptography, security policies and cyber laws.



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7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Participative	Seminars
2.	Experimental	Quiz
3.	Problem solving	Troubleshoot (debug) code

8. Course Assessment Plan**a) Weightage of Marks in Continuous Internal Assessments and Written Exam**

CO	Continuous Internal Assessments CIA -40%	End Semester Examination-60%
CO1	CIA 1 – Written Test	Written Exam
CO2	CIA 2 – Written Test	
CO3	CIA 2 – Written Assignment	
CO4	CIA 3 – Lab Test	



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b) Model Question Paper- End Semester Exam**INFORMATION SECURITY AND CYBER LAWS**

Course code: U24/CAP/DSE/602

Max. Marks: 60

Credits: 4

Time: 2 Hrs.

SECTION-A**I. Answer the following:****4X10=40M**

1. How do you protect information from unauthorized access?
OR
2. Explain different types of Information Systems.

3. What are some common cyber threats?
OR
4. How can organizations protect themselves from cyber-attacks?
5. How does a transposition cipher, like the Rail-Fence cipher, work?
OR
6. What is cryptography and why is it important in information security?
7. What are the key provisions of the IT Act, 2008, regarding cyber security and data protection?
OR
8. What are the main objectives of Indian Cyber law?

SECTION B**II. Answer any 4 questions:****4 x 5 = 20M**

9. Why is information security important?
10. What are protocols, and why are they important in networking?
11. What is the difference between cyber warfare and cyber terrorism?
12. Why is strong authentication important for cyber security?
13. How does encryption work in private key cryptography?
14. What are the implications of not having a Security Policy in place?



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**INFORMATION SECURITY AND CYBER LAWS
PRACTICAL**

1. Course Description:**Programme: B.Sc.****Max. Hours: 30****Course Code: U24/CAP/DSE/602/P****Hours per week: 2****Course Type: DISCIPLINE SPECIFIC ELECTIVE****Max. Marks: 50****No. of credits: 1****2. Course Objectives:**

- This course provides the student with a study of various network tools to verify passwords, crack passwords etc.
- It also discusses encryption, decryption, digital signature and password protection.

PRACTICAL SESSIONS

1. Demonstrate the use of Network tools: ping, ipconfig,
2. Demonstrate the use of Network tools: ifconfig.
3. Demonstrate the use of Network tools: tracert, arp
4. Demonstrate the use of Network tools: netstat.
5. Demonstrate the use of Network tools: whois.
6. Use of Password cracking tools: John the Ripper, Ophcrack.
7. Verify the strength of passwords using John the Ripper.
8. Verify the strength of passwords using Ophcrack.
9. Perform encryption of Caesar cipher. Write a script for performing these operations.
10. Perform decryption of Caesar cipher. Write a script for performing these operations.
11. Perform encryption of a Rail fence cipher. Write a script for performing these operations.
12. Perform decryption of a Rail fence cipher. Write a script for performing these operations.
13. Demonstrate sending of a protected word document.
14. Demonstrate sending of a digitally signed document.
15. Demonstrate sending of a protected worksheet.



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INFORMATION SECURITY AND CYBER LAWS**PRACTICAL**

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

Max. Marks: 50M
Time: 2hrs

I. Answer the following:

1. Perform encryption of Caesar cipher. Write a script for performing these operations.
2. Demonstrate sending of a protected word document.

OR

3. Demonstrate the use of Network tools: ifconfig

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
I	15	1	2	10	2	5
II	15	2	2	10	2	5
III	15	3	2	10	1	5
IV	15	4	2	10	1	5

9. CO-PO Mapping

CO	PO	Cognitive Level	Classroom sessions(hrs)
1	3	2	15
2	3	3	15
3	1,5	5	15
4	1	6	15

Prepared by	Checked & verified by	Approved by
 Divya Rachala Teaching Faculty	 Ms. D. Sowjanya HOD	 Dr. Uma Joseph Principal


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SEMESTER –VI
SEC-IV MATERIAL SCIENCE AND CATALYSIS

1. Course Description

Programme: B.Sc.

Course Code: U24/CHE/SEC/601

2 Type of course: SEC

No. of credits: 2

Max. Hours: 30

Hours per week:

Max. Marks: 50

2. Course Objectives:

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

3. Course Outcome:

CO 1: Gain foundation in the principles of catalysis and apply at nanoscale.

CO 2: Identify and explain the mechanisms of catalytic reactions including the role of active sites and reaction pathways.

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


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4. Course Content:**Module I: NANOMATERIALS AS CATALYSTS****15 Hrs**

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

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

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

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

Module II: CATALYSIS**15 Hrs**

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

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

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

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

5. References:

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

8. Course Assessment Plan

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

CO	Continuous Internal Assessments CIA - 40%	End Semester Examination-60%
CO1	CIA1- Assignment	Written Exam
CO2	CIA2- Skill test	

9.

a) Weightage of Marks in Formative and Summative Assessments

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



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6. Syllabus Focus

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

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

7. Components on Skill Development/Entrepreneurship Development/Employability

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


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b) Question Paper Pattern

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Model Paper

B.Sc. III - Semester VI

SKILL ENHANCEMENT COURSE

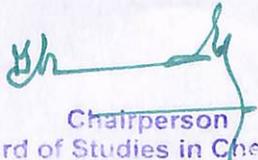
MATERIAL SCIENCES AND CATALYSIS

Course Code: U24/CHE/SEC/601

Time: 1 Hr

Max. Marks: 30

SECTION A - Answer any six questions 6 x 5 = 30 Marks				
Question Number	MODULE	Question	CO	BTL
1	Module 1	What are the different Types of Nanocatalysis?	CO 1	(Level IV)
2	Module 1	Explain the Mechanism of Nanocatalysis.	CO 1	(Level II)
3	Module 1	Write a note on Prospects of Nanocatalysis in Green Chemistry with examples.	CO 1	(Level I)
4	Module 1	Explain any 4 applications of Nanocatalysis.	CO 1	(Level I)
5	Module 2	Define catalysis. Give the characteristics of catalysis.	CO 2	(Level I)
6	Module 2	Derive Michaelis - Menten Equation.	CO 2	(Level IV)
7	Module 2	Discuss the principle of Phase transfer Catalysis.	CO 2	(Level II)
8	Module 2	Explain the kinetics of Acid-catalyzed reactions.	CO 2	(Level IV)


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SEMESTER - VI
MOBILE APPLICATIONS

1. Course Description:**Programme: B.Sc.****Course Code: U24/CAP/DSE/601****Course Type: DISCIPLINE SPECIFIC ELECTIVE****No. of credits: 4****Max. Hours: 60****Hours per week: 4****Max. Marks: 100****2. Course Objectives:**

To enable students to have a good understanding of smartphones and developing apps for Android phones.

3. Course Outcomes:

On completion of this course, students will be able to:

CO1: *Illustrate* the life-cycle mechanism of mobile software. (Cognitive level – 3)

CO2: *Develop* rich multi-threaded graphical interfaces. (Cognitive level – 6)

CO3: *Apply* multimedia objects in their solutions. (Cognitive level – 3)

CO4: *Develop* Android app. (Cognitive level – 6)



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4. Course Content:**MODULE I: INTRODUCTION TO PROGRAMMING (15 hrs)
AND APP INVENTOR**

Introduction to App Inventor, Working with Media: Displaying Images, Duplicating Blocks and Using Dropdowns, Sounds, Color Blocks, Layout Components, Input, Variables, and Calculations: The Text Box Component, Performing Calculations

MODULE II: CONTROL STRUCTURES (15 hrs)

Storing Data with Variables, Creating Blocks with Type blocking, Math Functions. Decision Blocks and Boolean: Introduction to Decision Blocks, Relational Operators and the if Block, The if then else Block A First Look At Comparing Strings, Logical Operators, Nested Decision Blocks, The if then else if Block

MODULE III: LOOPING (15 hrs)

The Screen's Initialize Event, The ListPickerComponent, The CheckBox Component, Repetition Blocks, Times, and Dates: The Notifier Component, The while Loop, The for each Loop, The Clock Component, The DatePicker Component Procedures and Functions.

MODULE IV: LISTS AND STRINGS (15 hrs)

Lists -Graphics and Animation: The Canvas Component, The Ball and ImageSprite Component, Using the Clock Component to Create Animations Working with Text: Concatenating Strings, Comparing Strings, Trimming a String, Converting Case, Finding Substring, Replacing a Substring, Extracting a Substring, Splitting a Substring Text to Speech and Text Messaging.

5. References

1. Starting Out with App Inventor for Android by Tony Gaddis, Rebecca Halsey, Pearson Education Limited, 1/E, 2015
2. Beginning Android by Mark L. Murphy, Dreamtech Press, 1/E, 2009
3. Android – A Programmer's Guide, J.F. DiMarzio, McGraw Hill Education, 1/E, 2010
4. Android in Action, W Frank Ableson, Robi Sen, Chris King, Dreamtech Press, 2/E, 2011
5. Practical Android Projects, Lucas Jordan, Pieter Greyling, APress, 1/E, 2011
6. <http://appinventor.mit.edu/>

6. Syllabus Focus**a) Relevance to Local, Regional, National and Global Development Needs**

Local /Regional/National /Global Development Needs	Relevance
Global Development	Mobile App Development is an adaptable, effective, and performance-driven language and is widely employed in everything from system software to game development.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Modules 1 and 2	Develop an application that uses GUI components, Font and Colours Layout Managers and event listeners.
EMP	Modules 3 and 4	Develop an application that uses Looping Statements, Functions, Strings and Animations

7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Participative	Seminars
2.	Experimental	Quiz
3.	Problem solving	Troubleshoot (debug) code



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

CO	Continuous Internal Assessments CIA -40%	Written Exam-60%
CO1	CIA 1 – Written Test	Written Exam
CO2	CIA 2 – Written Test	
CO3	CIA 2 – Written Assignment	
CO4	CIA 3 – Lab Test	



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b) Model Question Paper- End Semester Exam**MOBILE APPLICATIONS****Course Code: U24/CAP/DSE/601****Max. Marks: 60****Credits: 4****Max. Time: 2 hrs****SECTION –A****I. Answer the following****4X10=40 M**

1. What are the main steps that need to be followed to develop an app?

OR

2. What is the Text Box Component? Describe different properties of Textbox Components?

3. What is the scope of a local variable? What is the scope of a global variable?

OR

4. What is a function? What are different math functions?

5. What types of relationships between numeric values can you test with relational operators?

OR

6. How do you determine which item the user selected with a List Picker?

7. Explain with an example the procedure to

- a) Concatenating Strings,
- b) Comparing Strings
- c) Trimming a String

OR

8. Explain the procedure to Create Animations using the Clock Component

SECTION –B**II Answer any FOUR****4x5=20 M**

- 9. How do you create a comment for a block?
- 10. Define a Variable? What are the rules to name a variable?
- 11. Describe how the logical operators work with an example?
- 12. Explain Math functions.
- 13. What is the purpose of the Rotates property?
- 14. What is the purpose of the canvas component?

**MOBILE APPLICATIONS
PRACTICAL**

1. Course Description:**Programme: B.Sc.****Course Code: U24/CAP/DSE/601/P****Course Type: DISCIPLINE SPECIFIC ELECTIVE****No. of credits: 1****Max. Hours: 30****Hours per week: 2****Max. Marks: 50****2. Course Objective:**

To enable students to have a good understanding of smartphones and developing apps for Android phones.

3. Course Outcomes:**CO1:** To construct rich multi-threaded graphical interfaces.**CO2:** To develop Android apps.

PRACTICAL EXERCISES

- 1 Create the Screen for the Hello World App
2. Develop a mobile app to Create Good Morning Translator App
3. Design a mobile app to change the Screen's Background Image
4. Create a mobile app for layout components and Colour Blocks
5. Design the mobile app for the Kilometre Converter
6. Develop a mobile app for Grader App
7. Design a mobile app to demonstrate checkbox components
8. Demonstrate a mobile app for while loop
9. Design a mobile app to Calculate Sum of Consecutive Numbers
10. Design a mobile app to create Lights
11. Design a mobile app to demonstrate lists
12. Design a mobile app to validate an Email Address
13. Design a mobile app of your college having college information, features, events and placement.
14. Simple Widgets. Implementing a Pizza ordering Android App.
15. Using Data Adapter & Image View Controls. Vehicle Screening App.

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**MOBILE APPLICATIONS
PRACTICAL**

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

Max. Marks: 50M

Credits:1

Time: 2hrs

I. Answer any two:

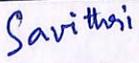
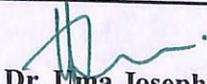
1. Design a mobile app to validate an Email Address
2. Design a mobile app to demonstrate on List Picker
3. Design a mobile app for Grader app

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
I	15	1	2	10	1	5
II	15	2	2	10	1	5
III	15	3	2	10	2	5
IV	15	4	2	10	2	5

9. CO-PO Mapping

CO	PO	Cognitive Level	Classroom sessions (hrs)
1	1	3	15
2	1	6	15
3	2	3	15
4	2	6	15

Prepared by	Checked & verified by	Approved by
 Ms. Savithri Teaching Faculty	 Ms. D. Sowjanya HOD	 Dr. Uma Joseph Principal


PROFESSOR
 Department of Computer Science & Engineering
 University College of Engineering (A) St. Francis College for Women, Hyderabad
 Osmania University,
 Hyderabad-500 007.

SEMESTER –VI

PHARMACEUTICAL BIOCHEMISTRY

1. Course Description:

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

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

2. Course Objectives:

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

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

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

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

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

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


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Hyderabad-500 007 (TS)

4. Course Content

Module I: INTRODUCTION TO PHARMACOLOGY (15 hrs)

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

Module II: PHARMACOKINETICS (15 hrs)

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

Module III: PHARMACODYNAMICS (15 hrs)

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

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

Module IV: ADVERSE DRUG EFFECTS (15 hrs)

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

5. Reference Books:

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

6. Syllabus Focus

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

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

b. Components on Skill Development/Entrepreneurship Development/Employability

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

7. Pedagogy

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

8. Course Assessment Plan

a) Weightage of Marks in Formative and Summative Assessments

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

b) Model Question Paper

PHARMACEUTICAL BIOCHEMISTRY

Code: U24/BIC/DSE/602
Credits: 4

Max Marks: 60
Time: 2 Hrs

I. Answer the following questions

(4x10=40M)

1. (a) Discuss biological membrane transport systems.
(OR)
(b) Explain sources and classification of Drugs.
2. (a) Discuss routes of drug administration with examples
(OR)
(b) Demonstrate role of drugs as enzyme inhibitors with examples.
3. (a) Categorise factors modifying drug action.
(OR)
(b) Analyze essential drugs and their metabolic relevance.
4. (a) Assess adverse drug responses in brief.
(OR)
(b) Hypothesise on drug abuse and addiction.

II. Write Short notes on any 4 questions

(4x5=20 M)

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

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

DSE 2B: Pharmaceutical Biochemistry

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

**PHARMACEUTICAL BIOCHEMISTRY
PRACTICAL**

1. Course Description:

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

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

2. Course objective:

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

3. Course Outcome:

This course will help the students to-

CO1: Enhance knowledge on drug labels.

CO2: Analyse various components of pharmaceuticals

PRACTICAL SESSIONS

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


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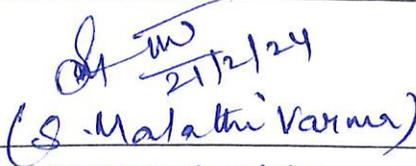
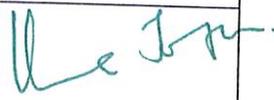
**MODEL QUESTION PAPER
PRACTICAL**

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

Max Time: 2 Hrs
Max. Marks: 50

Answer the following:

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

Prepared by Course Teacher [Name & Signature]	Checked & verified by HOD [Name & Signature]	Approved by the Principal
	 21/2/24 (S. Malathi Varma)	

HOD Biochemistry
St. Francis College for Women
Begumpet, Hyderabad-16.

SEMESTER –VI

PLANT BIOCHEMISTRY

1. Course Description

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

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

2. Course Objectives:

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

3. Course Outcomes: It helps the graduates to-

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

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

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

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

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4. Course Content –

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

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

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

Nitrogen Cycle. Nitrogen Metabolism: Mechanism and Regulation of Utilization of Ammonia, Nitrate and other Nitrogen Sources, Nitrogen Fixation: Mechanism and Regulation of Nitrogen Fixation, Symbiotic and Asymbiotic Nitrogen Fixation and Biochemistry of Nitrogenase. Representatives of alkaloid group and their amino acid precursors, function of alkaloids, Examples of major phenolic groups: flavonoids, tannins and lignin, biological role of plant phenolics.

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

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

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

Module IV: PLANT TISSUE CULTURE (15hrs)

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

5. **Reference Books:**

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

6. Syllabus Focus

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

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

b) Components on Skill Development/Entrepreneurship development/Employability

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

7. Pedagogy

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

8. Course Assessment Plan

a) Weightage of Marks in Formative and Summative Assessments

COs	Formative Assessment - FA (40%)	Summative Assessment - SA (60%)
CO1	CIA-1	End Semester exam
CO2		
CO3	CIA-2 Presentation/ Model making/Quiz/ Assignment	
CO4	CIA-2 Objective test	

b) Model Question Paper

PLANT BIOCHEMISTRY

Code : U24/BIC/DSE/601
Credits : 4

Max. Marks: 60
Time :2 Hrs

I. Answer the following questions

(4x10=40M)

1. (a) Describe the fluid Mosaic model of Plasma Membrane.
OR
(b) Explain plastids & add a note on significance of peroxisomes.
2. (a) Illustrate in detail Cyclic & Non-Cyclic Photophosphorylation.
OR
(b) Illustrate Nitrogen Cycle with appropriate diagram.
3. (a) Analyze the mechanism of growth regulation by plant hormones.
OR
(b) Compare different secondary metabolites with biological significance.
4. (a) Compile various Cell & Tissue Culture Techniques.
OR
(b) Compose the various Plant Regeneration Pathways?

II. Write Short notes on any 4 questions

(4x5=20M)

5. Cell Wall
6. CAM
7. Tannins & Lignins
8. Functions of Alkaloids
9. Auxins
10. Gibberlins

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

Semester V: DSE 2A- Plant Biochemistry

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

**PLANT BIOCHEMISTRY
PRACTICAL****1. Course Description:**

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

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

2. Course Objectives:

Introduce the basic practical knowledge of plant biochemistry.

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

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

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

PRACTICAL SESSIONS

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

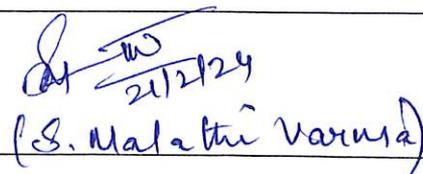
**MODEL QUESTION PAPER
PRACTICAL**

Course Code: U24/BIC/DSE/601/P
Credits: 1

Max Time: 2 Hrs
Max. Marks: 50

Answer the following:

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

Prepared by Course Teacher [Name & Signature]	Checked & Verified by HOD [Name & Signature]	Approved by the Principal
	 21/2/24 (S. Malathi Varma)	

HOD Biochemistry
St. Francis College for Women
Begumpet, Hyderabad-16.

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.


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Dept of Chemistry
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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, Hyd-07.

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)

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)
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.****Max. Hours:60****Course Code: U24/CAP/PRJ/601****Max. Marks: 100****Course Type: PROJECT****Hours per week:4****No. of credits: 4****2. Course Objectives**

1. To improve the team building, communication and management skills of the students.
2. To enable students to gain hands on experience
3. To inculcate research spirit of enquiry into the subject

3. Course Outcomes:

CO1: Demonstrate an ability to work in teams and manage the conduct of the research study.

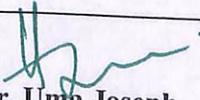
CO2: Formulate and propose a plan for creating a solution for the research plan identified

CO3: To develop a sample project integrating the knowledge gained during the course

Internal Evaluation of Project-40 M**Scheme of evaluation**

Synopsis - Submission & Presentation	10M
Mid Term Evaluation	10 M
Project Presentations	20 M

External Evaluation of Project -60 M

Prepared by	Checked &verified by	Approved by
 Ms. Ummya Mohammedi Teaching Faculty	 Ms. D. Sowjanya HOD	 Dr. Uma Joseph Principal


PROFESSOR
 Department of Computer Science & Engineering
 University College of Engineering (A)
 Osmania University,
 Hyderabad-500 007.

St. Francis College for Women, Hyderabad

**SEMESTER -VI
PROJECT****1. Course Description:**

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

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

2. Course Objectives:

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

3. Course Outcome:

CO1: Plan appropriate research topics through review of literature.

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

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

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

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

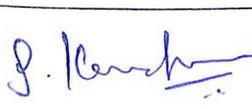
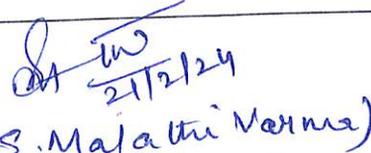
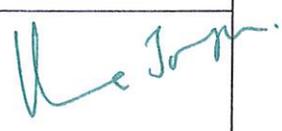
PROJECT PLAN & ASSESMENT

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

Internal Evaluation of Project-40 M**Scheme of evaluation**

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

External Evaluation -60 M (External Examiner)

Prepared by Course Teacher [Name & Signature]	Checked & verified by HOD [Name & Signature]	Approved by the Principal
	 21/2/24 (S. Malathi Verma)	

HOD Biochemistry
St. Francis College for Women
Begumpet, Hyderabad-500016

SEMESTER –VI

SEC-4 RESEARCH METHODOLOGY

1. Course Description:

Programme: B.Sc.

Course Code: U24/BIC/SEC/601

Type of course: SEC 4

No. of credits: 2

Max. Hours: 30

Hours per week: 2

Max. Marks: 50

2. Course Objectives:

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

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

CO 1: Create a good research design (L6)

CO2: Generate a report(L6)


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4. Course Content

Module I: INTRODUCTION TO RESEARCH METHODS

(15 hrs)

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

Module II: DATA ANALYSIS & SCIENTIFIC PAPER WRITING

(15 hrs)

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

5. **Reference Books:**

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

6. Syllabus Focus

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

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

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b. Components on Skill Development/Entrepreneurship Development/Employability

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

7. Course Assessment Plan

Weightage of Marks in Formative and Summative Assessments

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

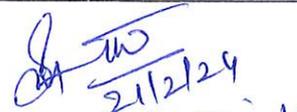
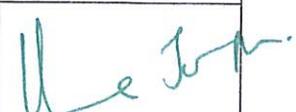
EXTERNAL- MODEL QUESTION PAPER

Course Code: U24/BIC/SEC/601
Credits: 2

Max Time: 1 Hr
Max. Marks: 30

Answer the following:

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

Prepared by Course Teacher [Name & Signature]	Checked &verified by HOD [Name & Signature]	Approved by the Principal
 21/2/24	 21/2/24 (S. Malathi Varma)	

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