

CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

Nationally Accredited with “A” Grade By NAAC

ISO 9001:2015 Certified

TIRUCHIRAPPALLI

PG DEPARTMENT OF CHEMISTRY



B.Sc., CHEMISTRY

SYLLABUS

2022-2023 and Onwards

CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

PG DEPARTMENT OF CHEMISTRY

VISION

- To progress into a centre of superiority in Chemistry that will blend state-of-the-art practices in professional teaching in a communally enriching way, with the holistic progress of the students as its prime emphasis.

MISSION

- To produce graduates committed to integrity, professionalism and lifelong learning by widening their knowledge horizons in range and depth.
- To awaken the young minds and discover talents to achieve personal academic potential by creating an environment that promotes frequent interactions, independent thought, innovations, modern technologies and increased opportunities.
- To enhance the quality through basic and applied research frameworks, and encourage the students to take part in entrance and competitive examinations for higher studies and career.
- To enhance services to the community and build partnerships with the industry.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Statements
PEO1	LEARNING ENVIRONMENT To facilitate value-based holistic and comprehensive learning by integrating innovative learning practices to match the highest quality standards and train the students to be effective leaders in their chosen fields.
PEO2	ACADEMIC EXCELLENCE To provide a conducive environment to unleash their hidden talents and to nurture the spirit of critical thinking and encourage them to achieve their goal.
PEO3	EMPLOYABILITY To equip students with the required skills in order to adapt to the changing global scenario and gain access to versatile career opportunities in multidisciplinary domains.
PEO4	PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY To develop a sense of social responsibility by formulating ethics and equity to transform students into committed professionals with a strong attitude towards the development of the nation.
PEO5	GREEN SUSTAINABILITY To understand the impact of professional solutions in societal and environmental contexts and demonstrate the knowledge for an overall sustainable development.

PROGRAMME OUTCOMES FOR B.Sc., Mathematics,

B.Sc., Physics, B.Sc., Chemistry PROGRAMME

PO NO.	On completion of B.Sc., Mathematics / B.Sc., Physics / B.Sc. Chemistry Programme, the students will be able to
PO1	DOMAIN KNOWLEDGE Analyse, design and develop solutions by applying firm fundamental concepts of basic sciences and expertise in discipline.
PO2	PROBLEM SOLVING Ability to think rationally, analyse and solve problems adequately with practical knowledge to assess the environmental issues
PO3	CREATIVE THINKING AND TEAM WORK Develop prudent decision-making skills and mobility to work in teams to solve multifaceted problems.
PO4	EMPLOYABILITY Self-study acclimatize them to observe effective interactive practices for practical learning enabling them to be a successful science graduate.
PO5	LIFE LONG LEARNING Assure consistent improvement in the performance and arouse interest to pursue higher studies in premium institutions.

PROGRAMME SPECIFIC OUTCOMES FOR B.Sc., CHEMISTRY

PSO NO.	The Students of B.Sc., Chemistry will be able to	POs Addressed
PSO1	Afford a firm foundation in Chemistry that stresses scientific reasoning, analytical problem solving with a molecular perspective	PO1 PO2
PSO2	Acquire knowledge in theoretical and practical tools to exemplify entirely in the working environment.	PO4 PO5
PSO3	Inculcate scientific temperament and create an awareness of the impact of chemistry on the environment, society, and development outside the scientific community.	PO3 PO4
PSO4	Scale up of chemical process after designing, optimization and analysis for developing products required for society.	PO4
PSO5	Expand the knowledge available opportunities related to chemistry in the government services through public service commission particularly in the field of food safety, health inspector, pharmacist etc.	PO4 PO5



Cauvery College for Women (Autonomous), Trichy-18

B.Sc. Chemistry

(For the Candidates admitted from the Academic year 2022-2023 and onwards)

Sem	Part	Course	Title	Subject Code	Inst. Hrs. /	Credits	Hrs.	Exam		Total
								Marks		
								Int.	Ext.	
I	I	Language Course – I (LC)/ Other Languages	Ikkala Illakiyam	22ULT1	6	3	3	25	75	100
			Hindi Literature & Grammar - I	22ULH1						
			History of Popular Tales Literature and Sanskrit Story	22ULS1						
			Basic French-I	22ULF1						
	II	English Language Course- I (ELC)	Functional English for Effective Communication - I	22UE1	6	3	3	25	75	100
	III	Core Course - I (CC)	General Chemistry	22UCH1CC1	5	5	3	25	75	100
		Core Practical - I (CP)	General Chemistry Practical	22UCH1CC1P	3	3	3	40	60	100
		First Allied I	Calculus and Fourier Series/ Biochemistry - I	22UCH1AC1A/ 22UCH1AC1B	4	3	3	25	75	100
		First Allied II	Algebra, Analytical Geometry of 3D & Trigonometry/ Biochemistry Practical	22UCH1AC2A/ 22UCH1AC2BP	4	3	3	25/ 40	75/ 60	100
	IV	Ability Enhancement Compulsory Course - I (AECC)	UGC Jeevan Kaushal Universal Human Values	22UGVE	2	2		100		100
		Total			30	22			700	

Semester I	Internal Marks: 25		External Marks: 75	
COURSE CODE	COURSE TITLE	CATEGORY	Hrs / Week	CREDITS
22UCH1CC1	GENERAL CHEMISTRY	CORE	5	5

Course Objectives

- The course reviews the structure of the atom, which is a necessary pre-requisite in understanding the nature of chemical bonding in compounds.
- It discusses the periodicity in properties with reference to the s and p block, which is necessary in understanding their group chemistry.
- It provides basic knowledge about ionic, covalent, metallic bonding and reactive intermediates.
- To understand the crystal structures of ionic compounds and the theoretical aspects of volumetric and qualitative inorganic analysis

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement	Cognitive Level
	On the successful completion of the course, students will be able to	
CO1	Outline the laboratory safety and management of chemical waste. Explain the bond parameters of the molecules on the basis of hybridization.	K2
CO2	Differentiate common and interfering acid radicals.	K2
CO3	Solve the conceptual questions using the knowledge of the quantum numbers and periodicity in atomic radii, ionic radii, ionization energy and electron affinity of elements.	K3
CO4	Interpret the crystal structure and their related properties of cubic system	K4
CO 5	Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved.	K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	2	3	2	1	3	2
CO2	3	2	1	2	2	3	3	1	1	2
CO3	3	2	2	3	3	3	3	2	2	3
CO4	3	1	2	3	2	3	3	2	1	2
CO5	3	2	3	3	3	3	3	2	2	2

“1” – Slight (Low) Correlation

“3” – Substantial (High) Correlation

“2” – Moderate (Medium) Correlation

“-” indicates there is no correlation.

Syllabus

UNIT I (15 Hours)

Atomic Structure and Periodic Properties: atomic Orbitals, quantum, numbers - Principal, azimuthal, magnetic and spin quantum numbers and their significance. Principles governing the occupancy of electrons in various quantum levels-Pauli's exclusion- principle, Hund's rule, Aufbau Principle, (n+l) rule, stability of half-filled and fully filled orbitals. - Classification as s, p, d & f block elements - variation of periodic properties along period and group - Electronegativity scale - Pauling's scale, Allred and Rochow's scale - Mulliken's scale -variation of metallic characters - Factors influencing the periodic properties.

UNIT II (15 Hours)

Chemical Bonding-I: Chemical Bond- definition - types of chemical bond - Illustration. Intermolecular forces - dipole - dipole interaction, induced dipole-induced dipole interaction. Hybridisation - Bond length, Bond energy, Bond angle - factors influencing BL, BE and BA. VB Theory - sp, sp², sp³ hybridisation - geometry of NH₃, H₂O, ClF₃, IF₃. VSEPR theory, Molecular Orbital Theory - Homonuclear (H₂, He₂, O₂, O₂⁺, O₂⁻, N₂, F₂) and Heteronuclear molecules (CO, NO, HF).

UNIT III (15 Hours)

Basics of Organic Compounds: IUPAC nomenclature of compounds, Classification, Isomerism, types of isomerism, structural and stereo isomerism, Cleavage of bonds: homolytic and heterolytic cleavages. Inductive, electromeric, mesomeric, resonance, hyperconjugation and steric effects. Reaction intermediates, carbocation, carbanion, free radicals, carbenes and nitrenes - generation, properties, structure and stability.

UNIT IV (15 Hours)

Structure of Solids: Crystal Structure - open and closed packed structures - ccp, hcp, covalent network, ionic and molecular structure, packing of ions in ccp and hcp, radius ratio, coordination number in ionic crystals, crystal structures-sodium chloride, zinc blende, wurtzite, rutile, cesium chloride, fluorite (unit cell diagrams). Crystal defects - Schottky and Frenkel defects.

UNIT V

(18 Hours)

Analytical Methods-I: Storage and handling of chemicals, handling of acids, ethers, toxic and poisonous chemicals and first aid procedure - Volumetric analysis - methods of expressing concentration - Primary and Secondary standards- Different types of titrations – Acid - Base Titrations, Titrimetric method, Iodimetry method - Iodometry Method, Complexometric Titration and Precipitation Titration. Qualitative Inorganic Analysis - Dry Test, Flame Test, Interfering acid radicals - Eliminating of Interfering acid radicals.

UNIT VI - Self Study for Enrichment

(Not to be included for External Examination)

Electronic configuration of polyelectronic atoms, Calculation of screening constant and effective nuclear charge - Lewis electron dot structure, Oxidation State and valency of element - Comparison of reactive intermediates based on their stability - Coordination numbers of cations and anions in ionic crystals from radius ratio, Difference between ionic and covalent crystals - Do and Don't in the Science Lab.

Text Books

1. Puri, B. R., Sharma, L. R. & Kalia, K. K. (2018). Principles of Inorganic Chemistry. Shoban Lal Nagin Chand & Co., New Delhi, 33rd edition.
2. Madan, R.D. (2019). Modern Inorganic Chemistry. S. Chand & Company Ltd, 3rd edition.
3. Bahl, B. S. & Arun Bahl (2021). Text book of Organic Chemistry. S. Chand & Company Ltd., 22nd revised edition.
4. Puri, B. R., Sharma, L. R. & Pathania, M. S. (2022). Principles of Physical Chemistry. Shoban Lal Nagin Chand & Co, New Delhi, 48th edition.
5. Gopalan, R., Subramanian, P. S. & Rengarajan, K. (2003). Elements of Analytical Chemistry. Sultan Chand & Sons, 2nd edition.

Reference Books

1. Soni, P. L. & Mohan Katyal. (2017). Text book of Inorganic Chemistry. Sultan Chand & Sons, 25th revised edition.
2. Vogel, A. I. (2000). Text Book of Quantitative Inorganic analysis including Elementary Instrumental Analysis. The English Language Book Society.

WebReferences

1. <https://www.thoughtco.com/definition-of-quantum-number-604629>
2. https://www.chemie-biologie.uni-siegen.de/ac/lehre/part1_solid_state.pdf
3. <https://testbook.com/learn/chemistry-vsepr-theory/>

Pedagogy

Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Seminar

Course Designers

1. Dr. P. Pungayee Alias Amirtham
2. Ms. A. Sharmila

Semester I	Internal Marks: 40		External Marks: 60	
COURSE CODE	COURSE TITLE	CATEGORY	Hrs/Week	CREDITS
22UCH1CC1P	GENERAL CHEMISTRY PRACTICAL	CORE	3	3

Course Objectives

- To learn the techniques of titrimetric analyses.
- To know the estimation of several cations and anions and to know the estimation of total hardness of water.

Course outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statements	Cognitive Level
	On the successful completion of the course, students will be able to	
CO1	Recall the basic principles of volumetric analysis	K1
CO2	Demonstrate the experimental methods of volumetric analysis	K2
CO3	Compare the hardness present drinking water	K2

Mapping of CO with PO and PSO

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	3	-	2	3	3	2
CO2	2	2	2	3	2	3	3	3	3	2
CO3	2	3	3	1	2	2	3	3	2	1

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“2” – Moderate (Medium) Correlation

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Syllabus

I. Titrimetric Quantitative Analysis

1. Estimation of HCl Vs NaOH using a standard oxalic acid solution
2. Estimation of Na_2CO_3 Vs HCl using a standard Na_2CO_3 solution
3. Estimation of oxalic acid Vs KMnO_4 using a standard oxalic acid solution
4. Estimation of Iron(II) sulphate by KMnO_4 using a standard Mohr's salt solution
5. Estimation of Ca(II) Vs KMnO_4 using a standard oxalic acid solution.
6. Estimation of KMnO_4 Vs thio using a standard $\text{K}_2\text{Cr}_2\text{O}_7$ solution.
7. Estimation of Fe(III) by using $\text{K}_2\text{Cr}_2\text{O}_7$ using a standard Mohr's salt solution using internal and external indicators.
8. Estimation of copper(II) sulphate by $\text{K}_2\text{Cr}_2\text{O}_7$ solution
9. Estimation of Mg(II) by EDTA solution
10. Estimation of Ca(II) by EDTA solution
11. Estimation of As_2O_3 using I_2 solution and standard arsenous oxide solution.
12. Estimation of chloride (in neutral and acid media)

II. Applied Experiments

1. Estimation of total hardness of water
2. Estimation of bleaching powder
3. Estimation of saponification value of an oil
4. Estimation of copper in brass

Text Books

1. Venkateswaran, V. & Veeraswamy R. and Kuandaivelu. (1997). Basic Principles of Practical Chemistry. 2nd edition. New Delhi, Sultan Chand & Sons.
2. Bassett, J. (1985). Text Book of Quantitative Inorganic Analysis. 4th edition. ELBS Longman.

Web References

1. <https://www.youtube.com/watch?v=wh6-cYjNNiA>
2. <https://chemlab.truman.edu/files/2015/07/edta.pdf>
3. <https://www.slideshare.net/mithilfaldesai/estimation-of-feii-ions-by-titrating-against-k2-cr2o7-using-internal-indicator>
4. <https://byjus.com/chemistry/titration-of-oxalic-acid-with-kmno4/>
5. <http://www.titrations.info/EDTA-titration-calcium>
6. <https://www.youtube.com/watch?v=qmVQs6Q7tso>

Course Designer

- Dr. C. Rajarajeswari

FIRST ALLIED COURSE-I (AC)
CALCULUS AND FOURIER SERIES
(2022-2023 Onwards)

Semester I	Internal Marks: 25		External Marks:75	
COURSE CODE	COURSE TITLE	CATEGORY	Hrs / Week	CREDITS
22UPH1AC1/ 22UCH1AC1	CALCULUS AND FOURIER SERIES	ALLIED	4	3

Course Objective

- Explore the students with mathematical methods formatted for their major concepts and train them in basic Integrations.
- Analyze mathematical statements and expressions.
- Evaluate the fundamental concepts of Differentiation and Integration.

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement	Cognitive Level
	On the successful completion of the course, students will be able to	
CO1	Apply the concepts of successive differentiation and Leibnitz theorem	K3
CO2	Compute and solve integrals of various types using trigonometric substitution and integration by parts	K3
CO3	Explain the properties of definite integrals and evaluate them.	K2
CO4	Classify reduction formula and evaluate double and triple integrals.	K3
CO5	Examine the Fourier series for full range, half range and odd & even functions.	K4

Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	2	3	2	2	2	2
CO2	3	2	2	2	2	3	2	2	2	2
CO3	3	2	2	2	2	3	2	2	2	2
CO4	3	2	2	2	2	3	2	2	2	2
CO5	3	2	2	2	2	3	2	2	2	2

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Syllabus

UNIT I

(15 Hours)

Successive Differentiation:

The n^{th} derivative – Standard results – Method of splitting the fractional expressions into partial fractions - Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the n^{th} derivative of a product (proof not needed) – A complete formal proof by induction (proof not needed) - Curvature- Circle, radius and center of curvature - Cartesian formula for the radius of curvature–Simple problems in all these.

UNIT II

(15 Hours)

Evaluation of integrals:

Integration of Rational algebraic functions– Rule (a) – Rule (b) Integration of the form $\int \frac{lx+m}{ax^2+bx+c} dx$ – Rule (c)- Integration of Irrational functions : Integration of the form $\int \frac{px+q}{\sqrt{ax^2+bx+c}} dx$ – Integration of the form $\int \frac{dx}{(x+p)\sqrt{ax^2+bx+c}}$ - Integration of the form $\int \frac{dx}{a+b\cos x}$ - Integration by Parts.

UNIT III

(13 Hours)

Reduction Formula:

Properties of definite integrals –Reduction formula (when n is a positive integer) for
1] $\int e^{ax} x^n dx$ 2] $\int x^n \cos ax dx$ 3] $\int \sin^n x dx$ 4] $\int_0^{\frac{\pi}{2}} \sin^n x \cos^m x dx$ (without proof) and illustrations.

UNIT IV

(10 Hours)

Double and Triple Integrals:

Definition of the double integral-Evaluation of Double integral(Problems Only)- Change of order and evaluation of the double integral (Problems only).

UNIT V

(07 Hours)

Fourier Series:

Definition of Fourier Series – Finding the Fourier Coefficients for a given periodic function with period 2π - Even and Odd functions.

UNIT VI

Self-Study for Enrichment :

(Not to be included for External examination)

Radius of curvature when the curve is in Polar co-ordinates - (i) $\int \frac{dx}{ax^2 + bx + c}$ (ii) $\int \frac{dx}{\sqrt{ax^2 + bx + c}}$ -

(1) $\int \cos^n x dx$ (2) $\int_0^{\frac{\pi}{2}} \cos^n x dx$ -Triple Integrals in simple cases(Problems Only)- Half range Fourier

series: Development in cosine series - Development in sine series.

Text Books

1. Narayanan, S & Manichavasagam Pillai, T.K. (2015). *Calculus Volume I*. S. Viswanathan Pvt Limited.
2. Narayanan, S & Manichavasagam Pillai, T.K. (2015). *Calculus Volume II*. S. Viswanathan Pvt Limited.
3. Narayanan, S & Manichavasagam Pillai, T.K. (2015). *Calculus Volume III*. S. Viswanathan Pvt Limited.

UNIT-I	Chapter 3:Sections 1.1 to 1.6,2.1,2.2[1] Chapter 10:Sections 2.1 to 2.3 [1]
UNIT-II	Chapter 1:Sections 7.1,7.3,7.4,8(CASE II, CASE V), 9, 12 [2]
UNIT-III	Chapter 1:Sections 11,13.1 to 13.5 [2]
UNIT-IV	Chapter 5:Sections 2.1,2.2,4 [2]
UNIT-V	Chapter 6:Sections 1to 3[3]

Reference Books

1. Arumugam Issac, S. & Somasundaram. (1999). Trigonometry & Fourier series. New Gamma Publishers.
2. Vittal, P. R. (2014). Allied Mathematics. Margham Publications.
3. Singaravelu, A. (2003). Differential Calculus and Trigonometry. R Publication.

Web Links

1. <https://www.youtube.com/watch?v=tBtF3Lr-VLk&t=64s>
2. <https://www.youtube.com/watch?v=Z4oSGuAZrZM>
3. https://www.youtube.com/watch?v=w6llnAQX_f8
4. <https://www.youtube.com/watch?v=LMcj8o0ERNE>
5. https://www.youtube.com/watch?v=_GAwQGCyWy0
6. <https://www.youtube.com/watch?v=9X3ggehCFII>

Pedagogy

Power point presentations, Group Discussions, Seminar, Quiz, Assignment.

Course Designers

1. Dr. P. Saranya
2. Ms. L. Mahalakshmi
3. Ms. P. Geethanjali

FIRST ALLIED COURSE-II (AC)
ALGEBRA, ANALYTICAL GEOMETRY OF 3D & TRIGONOMETRY
(2022-2023 Onwards)

Semester I	Internal Marks: 25		External Marks: 75	
COURSE CODE	COURSE TITLE	CATEGORY	Hrs / Week	CREDITS
22UPH1AC2/ 22UCH1AC2	ALGEBRA, ANALYTICAL GEOMETRY OF 3D & TRIGONOMETRY	ALLIED	4	3

Course Objective

- Analyze the mathematical methods formatted for their major concepts.
- Evaluate the problems in Algebra and Trigonometry.
- Explain the basics of Three-Dimensional geometry.

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement	Cognitive Level
	On the successful completion of the course, students will be able to	
CO1	Explain various types of matrices and procedures for solving them.	K3
CO2	Explore Binomial, Logarithmic and Exponential series.	K3
CO3	Describe sphere and several concepts of sphere.	K2
CO4	Examine the series expansion of sine, cosines, and tangents in all manners.	K4
CO5	Compute trigonometric operations using hyperbolic and inverse hyperbolic functions.	K3

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2	3	2	2	2	2
CO2	2	2	2	3	2	3	2	2	2	2
CO3	2	2	2	3	2	3	2	2	2	2
CO4	2	2	2	3	2	3	2	2	2	2
CO5	2	2	2	3	2	3	2	2	2	2

“1” – Slight (Low) Correlation

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Syllabus

UNIT I

(12 Hours)

Series Expansion:

Application of Binomial Theorem to summation of series – Approximate values – Summation of series by Exponential series - Summation of series by Logarithmic series (Formulae only).

UNIT II

(12 Hours)

Matrices:

Matrix-Special types of Matrices –Scalar multiplication of a matrix-Equality of matrices-Addition of matrices-Subtraction of matrices- Symmetric matrix-Skew symmetric matrix-Hermitian and Skew Hermitian matrix –Multiplication of matrix – Inverse matrix-Inner product-Solution of simultaneous equations-Rank of a matrix-Elementary transformation of a matrix-A system of m homogeneous linear equations in n unknowns-Linear dependence and independence of vectors-System of non-homogeneous linear equations - Eigen values and Eigenvectors.

UNIT III

(12 Hours)

Three Dimensional Geometry:

The Sphere – Definition- The equation of a sphere when the center and radius are given-The equation of a sphere to find its center and radius-The length of the Tangent Plane from a point to the sphere – The Plane Section of a sphere – Equation of a circle on a sphere – Intersection of two spheres in a circle.

UNIT IV

(12 Hours)

Expansion of Trigonometric functions:

Expansions of $\cos n\theta$ and $\sin n\theta$ -Expansion of $\tan n\theta$ in powers of $\tan \theta$ -Expansion of $\tan(A + B + C + \dots)$ (omitting examples on formation of equations) –Powers of sines and cosines of θ in terms of functions of multiples of θ – Expansions of $\cos^n \theta$ when n is a positive integer – Expansions of $\sin^n \theta$ when n is a positive integer – Expansions of $\sin \theta$ and $\cos \theta$ in a series of ascending powers of θ - The expansions of $\sin \theta$ and $\cos \theta$ to find the limits of certain expressions.

UNIT V

Hyperbolic functions:

(12 Hours)

Hyperbolic functions – Relation between hyperbolic functions – Relations between hyperbolic functions and circular functions - Inverse hyperbolic functions.

UNIT VI

Self-Study for Enrichment

(Not to be included for External examination)

Series which can be summed up by the Logarithmic series - Simple applications only-
The equation of the tangent plane to the sphere at a point. (Only problems) - Expansion of $\tan \theta$ in terms of powers of θ - Separation of real and imaginary parts of $\tanh(x+iy)$.

Text Books

1. Manichavasagam Pillai, T.K. Natarajan, T. & Ganapathy, K.S.(2015). *Algebra, Volume I*. S. Viswanathan Pvt Limited.
2. Manichavasagam Pillai, T.K. (2015). *Algebra, Volume II*. S. Viswanathan Pvt Limited.
3. Manichavasagam Pillai, T.K. & Natarajan, T. (2016). *A Text book of Analytical Geometry Part-II 3D*. New Gamma Publishers.
4. Manichavasagam Pillai, T.K. & Natarajan, T. (2013). *Trigonometry*. S. Viswanathan Pvt Limited.

UNIT-I Chapter 3:Sections 10,14[1]

Chapter 4:Sections 3,7,9 [1]

UNIT-II Chapter 2:Sections 1 to 16 [2]

UNIT-III Chapter 4:Sections 1-5,6,6.1,7,8 [3]

UNIT-IV Chapter 3:Sections 1 to 4, 4.1,5,5.1[4]

UNIT-V Chapter 4:Sections 1,2,2.1 to 2.3[4]

Reference Books

1. Manichavasagam Pillai, T. K. (1991). *Analytical Geometry 3D and Vector calculus*. New Gamma Publishers.
2. Pandey, H.D. Khan, M.Q. & Gupta, B. N. (2011). *A Text Book of Analytical Geometry and Vector Analysis*. Wisdom Press.
3. Singaravelu, A. (2003). *Differential Calculus and Trigonometry*. R Publication.

Web Links

1. <https://www.youtube.com/watch?v=JayFh5EJHcU>
2. <https://www.youtube.com/watch?v=h5urBuE4Xhg>
3. <https://www.youtube.com/watch?v=59z6eBynJuw>
4. <https://www.youtube.com/watch?v=9DyPyJb2N9g>
5. <https://www.youtube.com/watch?v=HOk2XLeFPDk>
6. <https://www.youtube.com/watch?v=G1C1Z5aTZSQ>

Pedagogy

Power point presentations, Group Discussions, Seminar, Quiz, Assignment.

Course Designers

1. Dr. P. Saranya
2. Ms. L. Mahalakshmi
3. Ms. P. Geethanjali

Semester I	Internal Marks: 25		External Marks: 75	
COURSE CODE	COURSE TITLE	CATEGORY	Hrs/Week	CREDITS
22UCH1AC1B	BIOCHEMISTRY-I	ALLIED	4	3

Course Objective

- To describe the chemistry of carbohydrates, proteins and lipids.
- To understand the importance of biomolecules in living organisms.
- To gain knowledge about the diseases occurring due to alterations in the levels of biomolecules.

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Understand the mechanism behind digestion and absorption of glucose	K1
CO2	Identify the general pathway of protein metabolism	K2
CO3	Analyze the results of lipid profile	K3
CO4	Realize the role of enzymes and their action in digestion	K2
CO5	Interpret laboratory findings using theoretical concepts of blood and bile	K4

Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2	3	2	3	3	2
CO2	3	2	3	3	2	3	1	2	2	3
CO3	3	3	1	2	3	3	3	3	3	3
CO4	3	2	3	2	3	2	1	2	2	2
CO5	3	3	2	2	3	3	3	3	3	3

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Syllabus

UNIT I

(13 Hours)

Carbohydrates: Definition of carbohydrate. Digestion and absorption of Glucose, Fate of glucose after absorption (preliminary idea). Intermediary metabolism of carbohydrates -glycogenesis, glycogenolysis, glycolysis, gluconeogenesis. Regulation of blood sugar - normal range -Hypoglycaemia and Hyperglycaemia - glucose tolerance tests - Diabetic Mellitus - Types and symptoms, glycosuria.

UNIT II

(13 Hours)

Proteins: Proteins - Definition - Peptide bond formation. Classification of proteins based on its physical properties - Structure of proteins: Primary structure - Secondary structure - Tertiary structure - Denaturation. Absorption, metabolic pool, general pathway of protein metabolism. Inborn errors of amino acid metabolism - Phenylketonuria, Alkaptonuria (Black urine syndrome) and albinism.

UNIT III

(12 Hours)

Lipids: Definition - lipids. Oxidation of fatty acids - β -oxidation cycle of saturated fatty acids. Ketogenesis, Ketosis, Ketolysis, role of liver in fat metabolism. Cholesterol - absorption, factors influencing absorption. Lipid profile - cholesterol, Triglycerides, lipoproteins - HDL and LDL. Fatty liver - Inborn errors of lipid metabolism.

UNIT IV

(12 Hours)

Enzymes: Definition, classification, examples - Glucose oxidase - mechanism of enzyme action, Factors influencing enzyme action. Digestive enzymes and their action - salivary digestion, gastric digestion, pancreatic and intestinal digestion. Thyroxine - Agents interfering with the synthesis of thyroid hormone, Diseases associated with abnormal metabolism of thyroxine.

UNIT V

(10 Hours)

Blood and Bile Pigments: Blood - functions of plasma proteins - blood groups and Rh factor, coagulation of blood mechanism. Haemoglobin - structure and properties of Hb, metabolism. Bile pigments - examples - Types of Jaundice (preliminary idea).

UNIT VI - Self Study for Enrichment

(Not to be included for External Examination)

Structure and classification of carbohydrates - Categories of amino acids - Types and functions of lipids - Properties and uses of enzymes - Properties and examples of bile pigments.

Text Books

1. Ambika, S. (2012). Fundamentals of Biochemistry for Medical Students. (7th ed.). Ippincott Williams & Wilkins.
2. Fatima, D., Nallasingam, K., Narayanan, L. M., Arumugam, N., Meyyan, R. P., & Prasanna Kumar, S. (2019). Biochemistry. (7th ed.). Saras Publication.
3. Jain, J. L., Jain, S., & Jain, N. (2016). Fundamentals of Biochemistry.(Revised ed.). S Chand & Co Ltd.

ReferenceBooks

1. Annie Ragland, & Arumugam, N. (2015). Biochemistry and Biophysics. (3rd ed.). Saras Publication.
2. Nelson,D. L., & Cox. M. M. (2017). Lehninger Principles of Biochemistry. (7thed.). WH Freeman.
3. Voet, D., Pratt,C. W., &Voet, J. G. (2012). Principles of Biochemistry. (4th ed.). John Wiley & Sons.
4. Berg, J. M., Stryer, L., Tymoczko, J., & Gatto, G. (2019). Biochemistry. (9th ed.). WH Freeman.
5. Mathews, C. K., Van Holde, K. E., & Ahern, K. G. (2000). Biochemistry. (3rd ed.). Pearson.

WebReferences

1. https://www.biologie.ens.fr/~mthomas/L3/intro_biologie/2-sucres-lipides-acides-nucleiques.pdf
2. <https://bio.libretexts.org/@go/page/1861>
3. <https://bio.libretexts.org/@go/page/16827>
4. <https://bio.libretexts.org/@go/page/16101>
5. <https://bio.libretexts.org/@go/page/16828>

Pedagogy

Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Seminar

Course Designer

Dr. S. Saranya

Course Objective

Semester I	Internal Marks: 40		External Marks: 60	
COURSECODE	COURSE TITLE	CATEGORY	Hrs / Week	CREDITS
22UCH1AC2BP	BIOCHEMISTRY PRACTICAL	ALLIED	4	3

- To expertise the student for analysis of any biological sample for identification of its chemical composition

Course Outcomes**Course Outcome and Cognitive Level Mapping**

CO Number	CO Statement	Cognitive Level
	On the successful completion of the course, students will be able to	
CO1	Identify the types of buffer and osazone derivatives	K1
CO2	Analyze carbohydrates, proteins and lipids qualitatively	K2
CO3	Apply various techniques for identification of biomolecules	K3
CO4	Evaluate the amount of glucose and proteins present using volumetric analysis	K2
CO5	Understand and interpret biochemical laboratory findings	K3

Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	3	2	2	1	3	2	1
CO2	3	3	2	3	3	3	2	3	3	3
CO3	3	3	3	2	3	3	3	3	3	3
CO4	3	2	2	3	2	3	2	3	3	1
CO5	3	3	3	3	3	3	3	3	3	3

“1” – Slight (Low) Correlation

“3” – Substantial (High) Correlation

“2” – Moderate (Medium) Correlation

“-” indicates there is no correlation.

Syllabus

QUALITATIVE ANALYSIS

(i) Preparation

1. Preparation of buffers (acidic, neutral and alkaline) and determination of pH.
2. Preparation of osazones.

(ii) Qualitative Identification

3. Qualitative identification of carbohydrates
 - Monosaccharides : Pentose, Glucose, Fructose, Mannose
 - Disaccharides : Sucrose, Maltose, Lactose
 - Polysaccharides : Starch, Dextrin and Glycogen
4. Qualitative identification of amino acids
 - Aliphatic : Histidine, Arginine, & Proline
 - Aromatic : Tyrosine, Tryptophan, Phenylalanine
 - Sulphur containing amino acids: Cystein, Cystine & Methionine
5. Qualitative identification of lipids - solubility, saponification, acrolein test, Salkowski test, Lieberman-Burchard test.

(iii) Isolation

6. Isolation of casein from milk.
7. Isolation of egg albumin from egg white.
8. Isolation of starch from potato.

QUANTITATIVE ANALYSIS

1. Estimation of glucose.
2. Estimation of protein.

DEMONSTRATION

1. Blood group test

Text Books

1. Rajan, S., & Selvi Christy. R. (2018). Experimental Procedures in Life Sciences. CBS Publishers & Distributors.
2. Gnanpragasam, N. S., & Ramamurthy. G. (2013). Organic Chemistry Lab Manual. Viswanathan, S., Printers & Publishers.

Reference Books

1. Zubay, C. (1986). Biochemistry. Addison Wesley.
2. Wood, W. B. (1981). Biochemistry- A problem Approach. Addison Wesley.

Web References

1. http://nec.edu.np/Publications/Chemistry_LAB_Manual/Experiment%204.pdf
2. <https://microbenotes.com/osazone-test/>
3. https://www.mlsu.ac.in/econtents/1616_Biochemical%20Tests%20of%20Carbohydrate.

- [%20protein,%20lipids%20and%20salivary%20amylase.pdf](#)
4. <https://vlab.amrita.edu/?sub=2&brch=191&sim=692&cnt=2>
 5. https://webstor.srmist.edu.in/web_assets/srm_mainsite/files/files/2%20ESTIMATION%20OF%20PROTEIN%20BY%20LOWRY.pdf

Pedagogy

Demonstration and practical sessions

Course Designer

Dr. S. Saranya

Semester I	Internal Marks: -		External Marks: 100	
COURSE CODE	COURSE TITLE	CATEGORY	Hours/Week	CREDITS
22UGVE	UGC JEEVAN KAUSHAL-UNIVERSAL HUMAN VALUES	Part IV	2	2

COURSE OBJECTIVES

1. To enable the learners to learn the values of love and compassion.
2. To foster the values of righteousness and service among the learners.
3. To enhance the morale of the learners by inculcating the values renunciation and peace.
4. To inspire the learners to practice the basic human values so as to make them become responsible citizens of the Nation.

COURSE OUTCOMES AND COGNITIVE LEVEL MAPPING

CO Number	CO Statement On the successful completion of this course, the students will able to	Cognitive Level
CO1	Define the values of Love and Compassion	K1
CO2	Understand the value of Truth and Non - Violence	K2
CO3	Explain the value of Righteousness and Service	K3
CO4	Practice the values of Renunciation (sacrifice) & Peace	K4
CO5	Prioritize Human Values in their day today life	K5

Syllabus

Unit I: (6 Hours)

Love and Compassion

- **Introduction:** what is love? Forms of love for self, parents family friend, spouse community, nation, humanity and other beings both for living and non-living.
- Love and Compassion and Inter-relatedness
- Love, compassion, empathy, sympathy and nonviolence
- Individuals who are remembered in history for practicing compassion and love.
- Narratives and anecdotes from history, literature including local folklore

Unit II: (7 Hours)

Truth and Non - Violence

- **Introduction:** what is truth? Universal truth, truth as value, truth as fact (veracity. sincerity, honesty among others)
- Individuals who are remembered in history for practicing this value

- Narratives and anecdotes from history, literature including local folklore
- **Introduction:** what is non violence? Its need. Love, compassion, empathy sympathy for others as pre-requisites for non violence
- Ahimsa as non -violence and non- killing.
- Individuals and organisations that are known for their commitment to non - violence
- Narratives and anecdotes about non - violence from history and literature including local folklore

Unit III: (6 Hours)

Righteousness and Service

- **Introduction:** What are Righteousness and service?
- Righteousness and dharma, Righteousness and Propriety
- Forms of service for self, parents, family, friend, spouse, community, nation, humanity and other beings- living and non-living persons in distress for disaster.
- Individuals who are remembered in history for practicing Righteousness and Service
- Narratives and anecdotes dealing with instances of Righteousness and Service from history, literature, including local folklore

Unit IV: (6 Hours)

Renunciation (sacrifice) & Peace

- Introduction: what is renunciation? Renunciation and sacrifice. Self restraint and ways of overcoming greed. Renunciation with action as true renunciation. What is peace? It's need, relation with harmony and balance.
- Individuals who are recommended in history for practicing Renunciation and sacrifice. Individuals and organisations that are known for their commitment to peace.
- Narratives and anecdotes from history and literature including local folklore about individuals who are remembered for their renunciation and sacrifice. Narratives and anecdotes about peace from history and literature including local folklore practicing peace

Unit V: (5 Hours) Practicing human values

- What will learners learn/gain if they practice human values? What will learners lose if they Don't Practice human values?
- Sharing learner's individual and/ or group experience(s)
- Simulated situations
- Case studies

Pedagogy: Chalk & Talk, Seminar, PPT Presentation, Group Discussion, Blended Method, and Case Study.

Course Designer :

Dr. G. Mettilda Buvaneswari