A.D.M. COLLEGE FOR WOMEN

(AUTONOMOUS)

Nationally Accredited with "A" Grade by NAAC - 3rd Cycle
(Affiliated to Bharathidasan University, Thiruchirappalli)
No.1, College Road, Velippalayam,
Nagapattinam – 611 001, Tamil Nadu, India

PG & RESEARCH DEPARTMENT OF CHEMISTRY

(For the candidates admitted from the academic year 2021-2022)

ALLIED SYLLABUS

B.Sc. Bio Chemistry&Geology

(2021-2024 Batch)

Allied Mathematics 2021- 2024 Batch

SCHEME OF THE PROGRAMME

S.No	Sem.	Class	Subject code	Title	Inst. Hours	Credit	Exam hours	Marks		Total marks
								CIA	SE	
1	I /III	I Biochemistry I Geology II Zoology	QUA1	AC I – Chemistry I	6	3	3	25	75	100
2	II /IV	I Biochemistry I Geology II Zoology II Physics	QUA2Y	AC II – Chemistry Practical I	6	3	3	40	60	100
3	II / IV	I Biochemistry I Geology II Zoology	QUA3	AC III – Chemistry III	4	3	3	25	75	100
4	III	II Physics	QUA1	AC I – Chemistry I	6	3	3	25	75	100
5	IV	II Physics	QUA3	AC III – Chemistry III	4	3	3	25	75	100

Semester-I / Allied Course I	**INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY I**	Course Code:QUA1
Instruction Hours: 4	Credits: 3	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K1-Recalling** **K2-Understanding** **K3-Applying** **K4-Analyzing** **K5-Evaluating** **K6-Creating**	
Course Objectives	• To study about Industrial Chemistry • To know about principles and techniques in water • To Study the properties of aromatic compounds • To learn the concepts of Chemical equilibrium • To acquire knowledge about chemical kinetics and catalyst	
UNIT	**CONTENT**	**HOURS**
Unit I	**Industrial Chemistry -** Fuel gases –water gas, producer gas, L.P.G ,Gobar gas and natural gas. Fertilizers- NPK and mixed fertilizers, micronutrients, and their role in plant life and biofertilizers, Soap and detergents an elementary idea about preparation and manufacture, cleaning action of soap and detergents.	**(12 Hrs)**
Unit II	**Water Chemistry –** Water –types of water – Soft and hard water – hardness, degree of hardness – Reverse osmosis and ion exchange methods – principles and techniques. **Water Analysis**- Determination of pH, TDS, Total hardness by EDTA, BOD and COD.	**(12 Hrs)**
Unit III	**Aromatic Compounds**- Structure, stability, resonance and aromaticity of benzene. Typical substitution reaction- Nitration, Halogenation, alkylation. **Chemotherapy**- Explanation with two examples each for i) Analgesics ii) Antibacterial iii)Anti-inflammatory iv) Antipyretic v) Antibiotic vi) Antitubercular vii)Antiviral viii) Antitussive ix) Antiallergic x) Antidiabetics xi) Antihypertensive xii) Antiepileptics xiii) Tranquilizers xiv) Antiseptic and disinfectant xv)Antimalarial xvi) Anaesthetics local and general (Structures not necessary).	**(12 Hrs)**
Unit IV	**Ionic Equilibria in aqueous solution –** Acids and bases, Arrhenius theory, Lowry – Bronsted concept, lewis concept – self ionization of water – weak acids and bases, dissociation constant, Hydrolysis – buffer solutions, action of buffers – acid base indicators - acid base titrations- basics complex ion equilibria. Corrosion – Types-prevention.	**(12 Hrs)**

Unit V	**Chemical Equilibrium** - Criteria of homogeneous and heterogeneous equilibria. Decomposition of HI, N_2O_4, $CaCO_3$ and PCl_5 **Chemical Kinetics**-Order of reactions and their determinations. Activation energy, effect of temperature on reaction rate. **Catalysis** -Types, mechanism of catalytic reactions, industrial applications.	**(12 Hrs)**

Text Book:

1.K.M.Tajun Meera Begum,N.M.I.Alhaji – " Allied Chemistry-I"AU publications-2016.
2. K.Vaidyanathan, A.Venkateswaran – "Allied Chemistry-I" Priya Publications-2016.

Reference Books:

1. PuriB.R.. Sharma L.R., Kalia K.K – "Principles of Inorganic chemistry", New edition: Shoban Lal Nagin chand and co. 35th edition ,2013.
2. B.S. Bahl and Arun Bahl "Advanced Organic Chemistry) New Delhi, Sultan Chand and Co.,(22th edition (2016)
3. Arun Bahl, B.S.Bahl, G.D.Tuli – "Essentials of Physical Chemistry",S.Chand, (2008)

e- Resources:

1. https:// www.chemistryguide.org/
2. http://chemcollective.org/home

Course Outcomes:

On completion of the course the learner will be able to

CO 1:	Identify a good fuel and their composition
CO 2:	Apply the water treatment methods
CO 3:	Know about chemical properties of aromatic compounds and drugs
CO 4:	Familiarize the concept of acid- base indicators
CO 5:	Apply the concept of chemical kinetics

Semester-I& II / Allied Course (P)	Allied Chemistry Practical	Course Code:QUA2Y
Instruction Hours: 3	Credits: 3	Exam Hours: 3
Internal Marks -40	External Marks-60	Total Marks: 100

Course Objectives:

- To perform quantitative analysis
- To identify the functional group in organic compounds

I. VOLUMETRIC ANALYSIS

1. Acidimetry and alkalimetry
   a) Strong acid Vs Strong base
   b) Weak acid Vs Strong base
   c) Determination of hardness of water
2. Permanganimetry
   a) Estimation of Ferrous Sulphate
   b) Estimation of Oxalic Acid
3. Iodometry
   a) Estimation of Copper
   b) Estimation of Potassium dichromate
   c) Estimation of Potassium permanganate

II.ORGANIC ANALYSIS

A study of the reactions of the following organic compounds

1. Carbohydrate 2. Amide 3. Aldehyde 4. Ketone 5. Acid 6. Amine 7. Phenol

Text Book:

1.Venkateswaran V,Veeraswamy R., Kulandaivelu AR., Basic Principles of Practical Chemistry, (2nd edition), New Delhi, Sultan Chand & Sons, (1997).
2. Gopalan.R, Subramaniam.P.S and Rengarajan.K, "Elements of Analytical Chemistry" S.Chand& Sons.

Reference Books:

1. Mendham.J, Denney.R.C, Barnes.J.D&Thomas.M, " Vogel's Textbook of quantitative analysis", 6th edition, Pearson education.

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2. http://chemcollective.org/home

Course Outcomes:

On completion of the course the learner will be able

CO 1:	To provide training on volumetric analysis
CO 2:	To acquire knowledge about organic compounds

Semester-II /Allied Course I	**INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY—III**	Course Code: QUA3
Instruction Hours: 4	Credits: 3	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K1-Recalling** **K2-Understanding** **K3-Applying** **K4-Analyzing** **K5-Evaluating** **K6-Creating**	
Course Objectives	• To understand the various theories of coordination chemistry • To learn about carbohydrates and proteins • To Study the natural products and polymers • To Learn about Chromatography • To know about the importance of pH and buffer	
UNIT	**CONTENT**	**HOURS**
Unit I	**Coordination Chemistry** Nomenclature of mononuclear complexes – Werner, Sidgwick, and Pauling's theories. Chelation and its industrial importance to EDTA. Biological role of hemoglobin and chlorophyll. Application of complexes in qualitative and quantitative analysis.	**(12Hrs)**
Unit II	**Carbohydrates-** Classification- glucose and fructose-preparation – elucidation of structure of glucose **Amino acids and protein** – Amino acids- classification based on structure- essential and non -essential amino acids- preparation and properties – peptides (elementary treatment)-proteins -classification based on physical properties and biological functions. Structures of proteins -primary and secondary (elementary treatment). DNA and RNA.	**(12Hrs)**
Unit III	**Synthetic Polymers**Teflon, alkyd and epoxy resins, poly esters – general treatment only. **Heterocyclic Compounds-** Furan, thiophene, pyrrole and pyridine– preparation and properties.	**(12Hrs)**
Unit IV	**Surface Chemistry-** Colloids, Emulsions, gels- preparation, properties and applications. Electrophoresis, chromatography- column, paper and thin layer chromatography **Photochemistry** -Laws of photochemistry and applications.	**(12Hrs)**

Unit V	**Identification of Organic Compounds -** Phenol, Carbohydrate, Amine, Amide, Aldehyde, Ketone and Carboxylic acid. **pH and Buffer -**Importance of pH and buffers in living systems – pH determination by colorimetric and electrometric methods.	**(12Hrs)**

Text Book:

1.M.Tajun Meera Begum,N.M.I.Alhaji – " Allied Chemistry-III"AU publications-2016.

2.V.Vaidyanathan,A.Venkateswaran – "Allied Chemistry-III" Priya Publications-2016.

Reference Books:

1. PuriB.R.. Sharma L.R., Kalia K.K - Principles of Inorganic chemistry.35thedition , New edition: Shoban Lal Nagin chand and co. 2013.
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Course Outcomes:

On completion of the course the learner will be able to

CO 1:	Give an idea about the biological function importance of hemoglobin and chlorophyll
CO 2:	Understand the biological functions of proteins
CO 3:	Understand the reactions of heterocyclic compounds
CO 4:	Know the separation techniques like chromatography
CO 5:	To identify the organic compounds**.**

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NAGAPATTINAM – 611 001

PG AND RESEARCH DEPARTMENT OF CHEMISTRY

ALLIED SYLLABUS

B.Sc. Zoology

(2021-2024 Batch)

Semester-III / Allied Course II	**INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY I**	Course Code: QUA1
Instruction Hours: 5	Credits: 3	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K1-Recalling** **K2-Understanding** **K3-Applying** **K4-Analyzing** **K5-Evaluating** **K6-Creating**	
Course Objectives	• To study about Industrial Chemistry • To know about principles and techniques in water • To Study the properties of aromatic compounds • To learn the concepts of Chemical equilibrium • To acquire knowledge about chemical kinetics and catalyst	
UNIT	**CONTENT**	**HOURS**
Unit I	**Industrial Chemistry -** Fuel gases –water gas, producer gas, L.P.G ,Gobar gas and natural gas. Fertilizers- NPK and mixed fertilizers, micronutrients, and their role in plant life and biofertilizers, Soap and detergents an elementary idea about preparation and manufacture, cleaning action of soap and detergents.	**(15Hrs)**
Unit II	**Water Chemistry –** Water –types of water – Soft and hard water – hardness, degree of hardness – Reverse osmosis and ion exchange methods – principles and techniques. **Water Analysis**- Determination of pH, TDS, Total hardness by EDTA, BOD and COD.	**(15 Hrs)**
Unit III	**Aromatic Compounds**- Structure, stability, resonance and aromaticity of benzene. Typical substitution reaction- Nitration, Halogenation, alkylation. **Chemotherapy**- Explanation with two examples each for i) Analgesics ii) Antibacterial iii)Anti-inflammatory iv) Antipyretic v) Antibiotic vi) Antitubercular vii)Antiviral viii) Antitussive ix) Antiallergic x) Antidiabetics xi) Antihypertensive xii) Antiepileptics xiii) Tranquilizers xiv) Antiseptic and disinfectant xv)Antimalarial xvi) Anaesthetics local and general (Structures not necessary).	**(15 Hrs)**
Unit IV	**Ionic Equilibria in aqueous solution –** Acids and bases, Arrhenius theory, Lowry – Bronsted concept, lewis concept – self ionization of water – weak acids and bases, dissociation constant, Hydrolysis – buffer solutions, action of buffers – acid base indicators - acid base titrations- basics complex ion equilibria. Corrosion – Types-prevention.	**(15 Hrs)**

Unit V	**Chemical Equilibrium** - Criteria of homogeneous and heterogeneous equilibria. Decomposition of HI, N_2O_4, $CaCO_3$ and PCl_5 **Chemical Kinetics**-Order of reactions and their determinations. Activation energy, effect of temperature on reaction rate. **Catalysis** -Types, mechanism of catalytic reactions, industrial applications.	**(15Hrs)**

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Course Outcomes:

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CO 1:	Identify a good fuel and their composition
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CO 3:	Know about chemical properties of aromatic compounds and drugs
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CO 5:	Apply the concept of chemical kinetics

Semester-III& IV / Allied Course (P)	Allied Chemistry Practical	Course Code:QUA2Y
Instruction Hours: 2	Credits: 3	Exam Hours: 3
Internal Marks -40	External Marks-60	Total Marks: 100

Course Objectives:

- To perform quantitative analysis
- To identify the functional group in organic compounds

I. VOLUMETRIC ANALYSIS

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   - c) Determination of hardness of water
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   - a) Estimation of Ferrous Sulphate
   - b) Estimation of Oxalic Acid
3. Iodometry
   - a) Estimation of Copper
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   - c) Estimation of Potassium permanganate

II.ORGANIC ANALYSIS

A study of the reactions of the following organic compounds

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Course Outcomes:
On completion of the course the learner will be able

CO 1:	To provide training on volumetric analysis
CO 2:	To acquire knowledge about organic compounds

Semester-IV /Allied Course II	**INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY—III**	Course Code:QUA3
Instruction Hours: 5	Credits: 3	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K1-Recalling** **K2-Understanding** **K3-Applying** **K4-Analyzing** **K5-Evaluating** **K6-Creating**	
Course Objectives	• To understand the various theories of coordination chemistry • To learn about carbohydrates and proteins • To Study the natural products and polymers • To Learn about Chromatography • To know about the importance of pH and buffer	
UNIT	**CONTENT**	**HOURS**
Unit I	**Coordination Chemistry** Nomenclature of mononuclear complexes – Werner, Sidgwick, and Pauling's theories. Chelation and its industrial importance to EDTA. Biological role of hemoglobin and chlorophyll. Application of complexes in qualitative and quantitative analysis.	**(15 Hrs)**
Unit II	**Carbohydrates-** Classification- glucose and fructose-preparation – elucidation of structure of glucose **Amino acids and protein** – Amino acids- classification based on structure- essential and non -essential amino acids- preparation and properties – peptides (elementary treatment)-proteins -classification based on physical properties and biological functions. Structures of proteins -primary and secondary (elementary treatment). DNA and RNA.	**(15 Hrs)**
Unit III	**Synthetic Polymers**Teflon, alkyd and epoxy resins, poly esters – general treatment only. **Heterocyclic Compounds-** Furan, thiophene, pyrrole and pyridine– preparation and properties.	**(15 Hrs)**
Unit IV	**Surface Chemistry-** Colloids, Emulsions, gels- preparation, properties and applications. Electrophoresis, chromatography- column, paper and thin layer chromatography **Photochemistry** -Laws of photochemistry and applications.	**(15 Hrs)**

Unit V	**Identification of Organic Compounds -** Phenol, Carbohydrate, Amine, Amide, Aldehyde, Ketone and Carboxylic acid. **pH and Buffer -**Importance of pH and buffers in living systems – pH determination by colorimetric and electrometric methods.	**(15 Hrs)**

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Course Outcomes:

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CO 1:	Give an idea about the biological function importance of hemoglobin and chlorophyll
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CO 3:	Understand the reactions of heterocyclic compounds
CO 4:	Know the separation techniques like chromatography
CO 5:	To identify the organic compounds**.**

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NAGAPATTINAM – 611 001

PG AND RESEARCH DEPARTMENT OF CHEMISTRY

ALLIED SYLLABUS

B.Sc. Physics

(2021-2024 Batch)

Semester-III / Allied Course II	**INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY I**	Course Code:QUA1
Instruction Hours: 5	Credits: 3	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K1-Recalling** **K2-Understanding** **K3-Applying** **K4-Analyzing** **K5-Evaluating** **K6-Creating**	
Course Objectives	• To identify a good fuel and their composition. • To learn electron displacement effects and Halogen compounds • To know about chemical properties of aromatic compounds and drugs • To learn solid state and Phase Rule • To apply the concept of chemical kinetics	
UNIT	**CONTENT**	**HOURS**
Unit I	**Industrial Chemistry -** Fuel gases –water gas, producer gas, L.P.G ,Gobar gas and natural gas. Fertilizers- NPK and mixed fertilizers, micronutrients, and their role in plant life and biofertilizers, Soap and detergents an elementary idea about preparation and manufacture, cleaning action of soap and detergents.	**(15 Hrs)**
Unit II	**ELECTRON DISPLACEMENT EFFECTS -** Polar effects: Inductive effect – Relative Strength of Aliphatic monocarbocylic acid and aliphatic amines. Resonance – Condition for resonance. Consequences of resonance – resonance of energy. Basic property of aniline and acidic property of phenol. Hyperconjugation – Heat of hydrogenation - Bond length and dipole moment. Steric effect. **HALOGEN COMPOUNDS -** Halogen containing compounds: Important chlorohydrocarbons used as solvents and pesticides – Dichloromethane, chloroform, carbon tetrachloride, DDT and BHC Types of solvents: - Polar, Non polar.	**(15 Hrs)**
Unit III	**Aromatic Compounds**- Structure, stability, resonance and aromaticity of benzene. Typical substitution reaction- Nitration, Halogenation, alkylation. **Chemotherapy**- Explanation with two examples each for i) Analgesics ii) Antibacterial iii)Anti-inflammatory iv) Antipyretic v) Antibiotic vi) Antitubercular vii)Antiviral viii) Antitussive ix) Antiallergic x) Antidiabetics xi) Antihypertensive xii) Antiepileptics xiii) Tranquilizers xiv) Antiseptic	**(15 Hrs)**

	and disinfectant xv)Antimalarial xvi) Anaesthetics local and general (Structures not necessary).	
Unit IV	**SOLID STATE, ENERGETICS AND PHASE RULE -** Solid state: Typical crystal lattices - unit cell, elements of symmetry, Bragg's equation, Weiss Indices, Miller indices, simple body centered and face centered lattices Energetics: First law of thermodynamics – state and path function – need for the second law – carnots cycle and thermo- dynamic scale of temperature, spontaneous and Non – spontaneous processes – entropy – Gibbs free energy. Phase rule: Phase, component, degree of Freedom, phase rule definitions - one component system– water system.	**(15 Hrs)**
Unit V	**Chemical Equilibrium** - Criteria of homogeneous and heterogeneous equilibria. Decomposition of HI, N_2O_4, $CaCO_3$ and PCl_5 **Chemical Kinetics**-Order of reactions and their determinations. Activation energy, effect of temperature on reaction rate. **Catalysis** -Types, mechanism of catalytic reactions, industrial applications.	**(15Hrs)**

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Course Outcomes:

On completion of the course the learner will be able to

CO 1:	Identify a good fuel and their composition
CO 2:	Gain Knowledge in Electron Displacements effects
CO 3:	Know about chemical properties of aromatic compounds and drugs
CO 4:	Familiarize the concept of Solid state and Phase rule
CO 5:	Apply the concept of chemical kinetics

Semester-III & IV / Allied Course (P)	Allied Chemistry Practical	Course Code:QUA2Y
Instruction Hours: 2	Credits: 3	Exam Hours: 3
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   - b) Estimation of Oxalic Acid
3. Iodometry
   - a) Estimation of Copper
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   - c) Estimation of Potassium permanganate

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A study of the reactions of the following organic compounds

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Course Outcomes:

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CO 1:	To provide training on volumetric analysis
CO 2:	To acquire knowledge about organic compounds

Semester-IV /Allied Course II	**INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY—III**	Course Code:QUA3
Instruction Hours: 5	Credits: 3	Exam Hours: 3
Internal Marks -25	External Marks-75	Total Marks: 100

Cognitive Level	**K1-Recalling** **K2-Understanding** **K3-Applying** **K4-Analyzing** **K5-Evaluating** **K6-Creating**	
Course Objectives	• To give an idea about the biological function importance of hemoglobin and chlorophyll • To understand the reactions of heterocyclic compounds • To identify the organic compounds**.** • To Familiarize the concept of acid- base indicators • To know the separation techniques like chromatography	
UNIT	**CONTENT**	**HOURS**
Unit I	**Coordination Chemistry** Nomenclature of mononuclear complexes – Werner, Sidgwick, and Pauling's theories. Chelation and its industrial importance to EDTA. Biological role of hemoglobin and chlorophyll. Application of complexes in qualitative and quantitative analysis.	**(15 Hrs)**
Unit II	**Synthetic Polymers**Teflon, alkyd and epoxy resins, poly esters – general treatment only. **Heterocyclic Compounds-** Furan, thiophene, pyrrole and pyridine– preparation and properties	**(15 Hrs)**
Unit III	**Identification of Organic Compounds -** Phenol, Carbohydrate, Amine, Amide, Aldehyde, Ketone and Carboxylic acid. **pH and Buffer -**Importance of pH and buffers in living systems – pH determination by colorimetric and electrometric methods.	**(15 Hrs)**
Unit IV	**Ionic Equilibria in aqueous solution –** Acids and bases, Arrhenius theory, Lowry – Bronsted concept, lewis concept – self ionization of water – weak acids and bases, dissociation constant, Hydrolysis – buffer solutions, action of buffers – acid base indicators- acid base titrations- basics complex ion equilibria. Corrosion – Types-prevention.	**(15 Hrs)**

Unit V	**Surface Chemistry-** Colloids, Emulsions, gels- preparation, properties and applications. Electrophoresis, chromatography- column, paper and thin layer chromatography **Photochemistry** -Laws of photochemistry and applications.	**(15 Hrs)**

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On completion of the course the learner will be able to

CO 1:	Give an idea about the biological function importance of hemoglobin and chlorophyll
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CO 3:	To identify the organic compounds**.**
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