E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.

(*An Autonomous Institution – Affiliated to Madurai Kamaraj University*)

Re-accredited (**3rd Cycle**) with Grade **A+** & **CGPA 3.51** by NAAC

DEPARTMENT OF CHEMISTRY

CBCS With OBE

BACHELOR OF SCIENCE

PROGRAMME CODE - K

COURSE STRUCTURE

(w.e.f. 2022 – 2023 Batch onwards)

Annexure-18

E.M.G. YADAVA WOMEN'S COLLEGE MADURAI -14.

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)
(Re –accredited (3rd cycle) with Grade A+ and CGPA 3.51 by NAAC)

DEPARTMENT OF CHEMISTRY – UG

(With Allied Mathematics and Allied Physics)

CBCS with OBE
COURSE STRUCTURE
(w.e.f. 2022 – 2023 Batch onwards)

Semester	Part	Course Code	Title of the Course	Teaching hrs (Per week)	Duration of Exam (hrs)	Marks Allotted			Credits
						CIA	SE	Total	
III	I	**22OUITA3**	**Part I:** Tamil	6	3	25	75	100	3
	II	**22OU2EN3**	**Part II:** English	6	3	25	75	100	3
	III	**22OUCH31**	**Core**: General Chemistry-III	4	3	25	75	100	4
	III		**Core**: Practical – II Volumetric Analysis	2	-	-	-	-	-
	III	**22OUCHGEMA3**	**GEC**: Mathematics–III Algebra and Statistics	6	3	25	75	100	4
	III	**22OUCHGEPH3**	**GEC** : Physics –I Mechanics and properties of matter	4	3	25	75	100	4
	III		**GEC** : Physics Practical –I	2	-	-	-	-	-
	I	**22OUITA4**	**Part I:** Tamil	6	3	25	75	100	3

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IV	II	**22OU2EN4**	**Part II:** English	6	3	25	75	100	3
	III	**22OUCH41**	**Core**: General Chemistry-IV	4	3	25	75	100	4
	III	**22OUCH4P**	**Core**: Practical – II Volumetric Analysis	2	3	40	60	100	2
	III	**22OUCHGEMA4**	**GEC** : Mathematics– IV Linear Programming	6	3	25	75	100	5
	III	**22OUCHGEPH4**	**GEC**: Physics- II Thermal Physics	4	3	25	75	100	4
	III	**22OUCHGEPH4P**	**GEC** : Physics Practical-I	2	3	40	60	100	1

GEC : Generic Elective Course
SEC : Skill Enhancement Course
DSEC : Discipline Specific Elective Course
AECC: Ability Enhancement Compulsory Course
IDC : Inter Disciplinary Course

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E.M.G.YADAVA WOMEN'S COLLEGE, MADURAI -14

(An Autonomous Institution - Affiliated to Madurai Kamaraj University)
(Re-Accredited with (3rd cycle) A+ & CGPA 3.51 Grade by NAAC)

DEPARTMENT OF CHEMISTRY-UG
Generic Elective Course

(For B.Sc., N&D**)**
CBCS with OBE

COURSE STRUCTURE
(w.e.f. 2022 – 2023 Batch onwards)

Semester	Course Code	Title of the Course	Teaching hrs. (Per week)	Duration of Exam (hrs.)	Marks allotted			Credits
					CIA	SE	Total	
III	22OUNDGECH3	**GEC** : Chemistry-I Bio Chemistry	4	3	25	75	100	4
		GEC: Chemistry Practical - I Inorganic Qualitative Analysis	2	-	-	-	-	
IV	22OUNDGECH4	**GEC** : Chemistry-II Environmental and Organic Chemistry	4	3	25	75	100	4
	22OUNDGECH4P	**GEC:** Chemistry Practical - I Inorganic Qualitative Analysis	2	3	40	60	100	1

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E.M.G.YADAVA WOMEN'S COLLEGE, MADURAI -14

(An Autonomous Institution - Affiliated to Madurai Kamaraj University)
(Re-Accredited with (3rd cycle) A^+ & CGPA 3.51 Grade by NAAC)

DEPARTMENT OF CHEMISTRY-UG

Generic Elective Course

(For B.Sc., Physics**)**

CBCS with OBE

COURSE STRUCTURE

(w.e.f. 2022 – 2023 Batch onwards)

Semester	Course Code	Title of the Course	Teaching hrs. (Per week)	Duration of exam (hrs)	Marks allotted			Credits
					CIA	SE	Total	
III	**22OUPHGECH3**	**GEC**: Chemistry –I Physical Chemistry	4	3	25	75	100	4
		GEC: Chemistry Practical - I Inorganic Qualitative Analysis	2	-	-	-	-	
IV	**22OUPHGECH4**	**GEC**: Chemistry –II Organic and Physical Chemistry	4	3	25	75	100	4
	22OUPHGECH4P	**GEC:** Chemistry Practical -I Inorganic Qualitative Analysis	2	3	40	60	100	1

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NOTE:

The students are permitted to obtain additional credits (Optional)

1. MOOCs / SWAYAM / NPTEL Courses (Online)
2. Project

Year	Semester	Title	Duration of Study	Credit
III	VI	Project title	6 months	1

Annexure-18

Department of Chemistry					Class: II B.Sc			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/ Week**	**CIA**	**SE**	**Total**
III	Core	22OUCH31	General Chemistry -III	4	4	25	75	100
Nature of the Course								
Knowledge and Skill Oriented			Employability Oriented		Entrepreneurship Oriented			
✓								

Course Objectives:

1. To study the preparation and chemical reactions of organo halogen compounds.
2. To understand the chemistry of s - block elements and its complexes.
3. To understand the characteristics of elements of Group III A and IVA and the Chemistry of Silicones.
4. To provide the detailed chemistry about p-block elements especially Nitrogen and Oxygen family.
5. To understand the nature of colloids.

Course Content:

UNIT– I: Organo Halogen Compounds:a) Alkyl halides: Preparation –general properties – nucleophilic substitution reactions -mechanisms of nucleophilic substitution reactions-SN^2 and SN^1 reactions with energy profile diagrams -mechanisms of elimination reactions. Fluorocarbons: Westron and Freon - elementary idea-Fluorocarbons impact on environment. b) Aryl halides: Preparation by halogenation, Sandmayer and Hunsdiecker reactions – general properties c) Aralkyl halides: Benzyl chloride – preparations and properties – comparison between aryl halide and aralkyl halide. Synthesis and uses of DDT and BHC

UNIT – II: s - Block Elements

Position of hydrogen in the periodic table, General characteristics of s – block elements – Compounds of s-block metals –preparation and properties of Lithium oxide and sodium oxide, sodium hydroxide, sodium peroxide- carbonates – bicarbonates – nitrates – halides-anomalous behaviour of Li and Be – extraction of beryllium – physical and chemical properties of Be – Uses – Extraction of Mg – physical and chemical properties – Uses. Complexes of s-block metals – complexes with crown ethers – biological importance sodium and potassium – Organometallic compounds of Li.

UNIT – III: p-Block Elements – Boron and Carbon family

General characteristics of elements of Group III A – Extraction of Boron - Physical and chemical properties of Boron – compounds of boron – Borax, Diborane, Boron nitride – Extraction of Al – Physical and Chemical properties - uses – compounds of aluminium (Al_2O_3, alums) – Alloys of aluminium. General characteristics of elements of Group IV A – Allotropic forms of carbon – Diamond and Graphite-Chemistry of charcoal – chemistry of oxides of carbon (CO_2)-preparation of Silicon – Physical and chemical properties of Si – Uses – preparation and properties of silicon dioxide – structures of silicates. Chemistry of silicones – Manufacture of glass – types of glasses.

UNIT – IV: p-Block Elements – Nitrogen and Oxygen family

General characteristics of elements of V A Group – Manufacture of nitrogen by Linde's process – Physical and chemical properties of nitrogen – uses – Chemistry of some compounds of nitrogen – hydrazine, hydrazoic acid-manufacture of nitric acid by Birkland and Eyde process –properties-uses-structure-nitrogen cycle. Preparation of phosphorus by old process – Physical and chemical properties of white phosphorus – uses of phosphorus – chemistry of PH_3, $PCl_5$and H_3PO_4– Oxides of Phosphorous (P_4O_{10}).oxides of oxygen (peroxides, basic oxides, amphoteric oxides, acidic oxides, neutral oxides) – Oxides of Sulphur (sulphur dioxide)–preparation, properties, uses and structure of H_2SO_4.

UNIT-V: Colloids

Colloids - Distinguishing characteristics of colloids, suspensions and solutions- Types of colloidal dispersions-Optical properties-Tyndall effect– Kinetic properties – Brownian motion-Electrical properties–Helmholtz and diffuse double layers – electro kinetic property – electrophoresis and its applications. Coagulation – methods of coagulation – Hardy Schultz law – Hofmeister series - Protective colloids – protective action – gold number – applications- Emulsions – classification, preparation, Gels – preparation – properties (thixotropy and syneresis).

Books for Study:

1. Jain M.K. Sharma S.C., (2015), "*Modern Organic Chemistry*", Vishal Publishing Co., Jalandhar.
2. Soni.P.L, (2007) "*Text book of Inorganic Chemistry*," 20th Revised Edition, Sultan Chand& Sons, New Delhi.
3. Puri B.R., Sharma L.R. and Pathania.M.S., (2013), "*Principles of Physical Chemistry*", Vishal Publishing Co, New Delhi.

Books for Reference:

1. Tewari K.S., Vishnoi N. K. and Mehotra S.N., (2001), "*A Text Book of Organic Chemistry*", 1st Edition, Vikas Publishing House Pvt. Ltd., New Delhi.
2. Morrision R.T. and Boyd R.N., (2011), "*Organic Chemistry*", 7th Edition, Dorling Kindersley (India) Pvt. Ltd., New Delhi.
3. Madan.R. D., (2014), "*Modern Inorganic Chemistry*," 3rd Revised Edition, S. Chand & Company Ltd., New Delhi
4. Puri.B.R., Sharma.L.R., Kalia.K.C., (2017), "*Principles of Inorganic Chemistry*," 23rd Edition, Shoban Lal Nagin Chand & Co., New Delhi.
5. Soni P.L., Dharmarha O.P., and Dash.U.N., (2011), "*Text Book of Physical Chemistry*", 23rd Edition, Sultan Chand & Sons, New Delhi.

Web Resources/e-books:

1. https://study.com/academy/lesson/electrophilic-substitution-aromatic-hydrocarbons.html
2. https://collegedunia.com/exams/s-block-elements-chemistry-articleid-5363
3. https://www.cleariitmedical.com/2019/04/chemistry-notes-p-block-elements-oxygen-family.html
4. https://testbook.com/learn/chemistry-colloids/

Pedagogy:

Chalk and Talk method, Power point Presentations, Seminar, Group Discussion, Quiz through ICT-Mode

Rationale for nature of Course:

Knowledge and Skill:

This course will enable the students to enrich the understanding capacity on fluoro carbons impact on environment, understand the chemistry of s and p-block elements and colloidal substances.

Activities to be given:

1. To collect information on fluorocarbon impact on environment and make as a group activity.
2. Power point presentation on the topic of s and p-block elements.

Course Learning Outcomes (CLOs)

CLOs	Course Learning Outcomes statements	Knowledge Level (According to Bloom's Taxonomy)
CLO 1	Outline the different reactions of alkyl halides and aralkyl halides	K1 to K3
CLO 2	Discuss the periodic properties of s-block elements	K1 to K3
CLO 3	Examine the properties of b block elements-boron and carbon family	K1 to K4
CLO 4	Explain the important compounds of b block elements-nitrogen and oxygen family	K1 to K3
CLO 5	Demonstrate the types, characteristics of colloids and preparation of emulsions	K1 to K4

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	1	2	3	1
CLO2	3	2	1	2	3	1
CLO3	3	3	2	2	3	1
CLO4	3	3	2	2	3	1
CLO5	3	3	3	2	3	1

1-Basic Level **2- Intermediate Level** **3- Advanced Level**

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LESSON PLAN: TOTAL HOURS (60Hrs)

Unit	Description	Hours	Mode
I	Alkyl halides: Preparation –general properties – nucleophilic substitution reactions -mechanisms of nucleophilic substitution reactions-SN^2 and SN^1 reactions with energy profile diagrams - mechanisms of elimination reactions.	3	Chalk and Talk, PPT
	Fluorocarbons: Westron and Freon - elementary idea -fluorocarbons impact on environment. b) Aryl halides: Preparation by halogenation, Sandmayer and Hunsdiecker reactions – general properties	4	Chalk and Talk, Seminar
	Aralkyl halides: Benzyl chloride – preparations and properties – comparison between aryl halide and aralkyl halide. Synthesis and uses of DDT and BHC	3	Chalk and Talk, PPT
II	Position of hydrogen in the periodic table, General characteristics of s – block elements – Compounds of s-block metals –preparation and properties of Lithium oxide and sodium oxide, sodium hydroxide, sodium peroxide	5	Chalk and Talk, PPT
	carbonates – bicarbonates – nitrates – halides-anomalous behavior of Li and Be – extraction of beryllium – physical and chemical properties of Be – Uses – Extraction of Mg – physical and chemical properties – Uses. Complexes of s-block metals – complexes with crown ethers – biological importance sodium and potassium – Organometallic compounds of Li.	7	Chalk and Talk, PPT, group discussion
III	General characteristics of elements of Group III A – Extraction of Boron - Physical and chemical properties of Boron – compounds of boron – Borax, Diborane, Boron nitride – Extraction of Al – Physical and Chemical properties - uses – compounds of aluminium(Al_2O_3, alums) – Alloys of aluminium.	7	Chalk and Talk, PPT
	General characteristics of elements of Group IV A – Allotropic forms of carbon –Diamond and Graphite-Chemistry of charcoal – chemistry of oxides of carbon (CO_2)-preparation of Silicon – Physical and chemical properties of Si – Uses – preparation and properties of silicon dioxide – structures of silicates. Chemistry of silicones – Manufacture of glass – types of glasses	7	Chalk and Talk, PPT,

IV	General characteristics of elements of V A Group – Manufacture of nitrogen by Linde's process – Physical and chemical properties of nitrogen – uses – Chemistry of some compounds of nitrogen – hydrazine, hydrazoic acid-manufacture of nitric acid by Birkland and Eyde process –properties-uses-structure-nitrogen cycle	4	Chalk and Talk, PPT and Seminar
	Preparation of phosphorus by old process – Physical and chemical properties of white phosphorus – uses of phosphorus – chemistry of PH_3, PCl_5 and H_3PO_4– Oxides of Phosphorous (P_4O_{10}).	6	Chalk and Talk, PPT
	oxides of oxygen (peroxides, basic oxides, amphoteric oxides, acidic oxides, neutral oxides) – Oxides of Sulphur (sulphur dioxide)–preparation, properties, uses and structure of H_2SO_4.	4	Chalk and Talk, PPT
V	Colloids - Distinguishing characteristics of colloids, suspensions and solutions- Types of colloidal dispersions-Optical properties-Tyndall effect– Kinetic properties – Brownian motion-Electrical properties–Helmholtz and diffuse double layers – electro kinetic property – electrophoresis and its applications.	4	Chalk and Talk, PPT, Quiz
	Coagulation – methods of coagulation – Hardy Schultz law – Hofmeister series -Protective colloids – protective action – gold number – applications- Emulsions – classification, preparation, Gels – preparation – properties (thixotropy and syneresis).	6	Chalk and Talk, PPT
	Total Hours	60	

Course Designers: 1. Dr.(Mrs).S.Manimekalai

2. Mrs.V.Gokilaa

Annexure-18

Department of Chemistry					Class: II B.Sc			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/ Week**	**CIA**	**SE**	**Total**
IV	Core	22OUCH41	General Chemistry -IV	4	4	25	75	100
Nature of the Course								
Knowledge and Skill Oriented			Employability Oriented		Entrepreneurship Oriented			
✓								

Course Objectives:

1. To know about aromaticity, aromatic electrophilic substitution and synthesis of some important aromatic compounds.
2. To get fundamental concepts on alcohols and phenol compounds.
3. To provide the detailed chemistry about halogen family.
4. To study about catalysis & surface chemistry.
5. To understand the kinetics and theories of reaction rates.

Course Content:

UNIT – I: Aromatic Compounds

Aromaticity - definition - Huckel's rule - consequence of aromaticity - stability, carbon carbon bond lengths in benzene ring, resonance energy - Aromatic electrophilic substitution - mechanism of nitration, halogenation, sulphonation, mercuration and Friedel-Crafts reaction - Energy profile diagrams - Activating and deactivating substituents - orientation in mono substituted benzenes - reactions of aromatic side chain - halogenation and oxidation - Methods of formation and chemical reactions of alkylbenzenes, naphthalene and Anthracene.

UNIT-II: Organohydroxy Compounds: a) Alcohols: Preparation from alkenes by hydration, hydroboration- oxidation and oxymercuration- demercuration methods – general properties. Ethylene glycols:Preparation, properties and uses- Glycerol: Preparation, properties and uses. b) Phenols: General methods of Preparation – properties- acidity of phenol and effect of substitutents- reactions of analytical importance. c) Aromatic alcohol: Benzyl alcohol- Preparation and properties-comparison with phenols.

UNIT-III: Halogen Family: a)Halogen compounds: Electronic configuration, diatomic nature, oxidizing property, electronegativity and electron affinity –Difficulties in the discovery and isolation of fluorine – peculiarities of fluorine – electropositive character of Iodineb) Interhalogen

Compounds: Interhalogen compounds: preparation, properties of ICl, ClF_3, ICl_3,IF_5, IF_7 – structure of ICl, ClF_3, IF_5, IF_7- poly halides and pseudo halogens.

UNIT-IV: Catalysis & Surface Chemistry: a) Catalysis: Definition – characteristics of catalytic reactions–Homogeneous catalysis: Acid-base catalysis-enzyme catalysis-Michaelis-Menten equation-autocatalysis- Heterogeneous catalysis – surface catalytic reactions – promoters-catalytic poison – theories of catalysis – applications of catalysis. b) Adsorption: Definition – various terms involved in adsorption – types of adsorption: physical and chemical adsorption - factors influencing adsorption – Adsorption Isotherms: Freundlich adsorption isotherm and Langmuir adsorption isotherm (no derivation) - applications of adsorption.

UNIT: V Chemical Kinetics: Introduction – rate of reaction – rate law and rate constant – order and molecularity – first order reactions – examples – rate equation – derivation – half life period - second order reactions - examples – rate equations – derivation - zero order and third order reactions - examples – rate equations (no derivation required) - determination of order of a reaction. Influence of temperature on the rate of reaction – Arrhenius rate equation and its significance – theory of reaction rates – Bimolecular collision theory-- derivation of rate constant of a bimolecular reaction - comparison between ARRT and CT – Lindemann theory of unimolecular reaction – Theory of absolute reaction rate.

Books for Study:

1. Bhupinder Mehta and Manju Mehta, (2012), "*Organic Chemistry*", PHI Learning Private Ltd., New Delhi.
2. Arun Bahl and Bahl B.S., (2016), "*A Text Book of Organic Chemistry*", 22nd Edition S.Chand & Company, New Delhi.
3. Madan R.D.(2019), "*Modern Inorganic Chemistry*", S. Chand & Company Ltd., New Delhi.
4. Puri B.R., Sharma L.R. and Pathania M.S., (2013), "*Principles of Physical Chemistry*", Vishal Publishing Co, New Delhi.

Books for Reference:

1. Morrison R.T. Boyd R.N. and Bhattacharjee S.K., (2011), "*Organic Chemistry*", 7th Edition, Pearson Education, South Asia.
2. Finar I.L ,(2004), "*Organic Chemistry*" Vol-1, 6th edn, Pearson Education Asia,
3. Soni P.L. and Mohan Katyal , (2013), " *Text book of Inorganic Chemistry*", Sultan Chand & Sons, New Delhi.

4. Puri, Sharma, Kalia, (2020), "*Principles of Inorganic Chemistry*", 33rd Edition, Vishal Publishing Company, New Delhi.
5. Arun Bahl, Bahl B.S.., Tuli G.D., (2021), " *Essentials of Physical Chemistry*", 28th edition, S.Chand, New Delhi.

Web Resources/e-books:

1. https://people.wou.edu/~avorder/Refrigeration.html
2. https://www.slideshare.net/ganeshmote1/phenols-106626111
3. https://unacademy.com/content/neet-ug/study-material/chemistry/chemical-properties-of-fluorine/
4. https://chemistnotes.com/physical/collision-theory-of-unimolecular-reaction-lindemanns-theory/#:~:text=Lindemann%20tried%20to%20explain%20the,the%20activation%20and%20the%20reaction.

Pedagogy:

Chalk and Talk method, Power point Presentations, Seminar, Group Discussion, Quiz through ICT-Mode

Rationale for nature of Course:

Knowledge and Skill:

Students acquire knowledge on aromatic electrophilic substitution, analytical importance of phenol, gain clear idea about halogen family and its applications, analyze adsorption techniques in day-to-day life.

Activities to be given:

1. Innovative model making in softening of hardwater, Froth floation process, separation of inert gases.
2. Construct the structure of interhalogen compounds using atomic model set.
3. Power point presentation on the concept of chemical kinetics and catalysis applications.

Annexure-18

Course Learning Outcomes (CLOs)

CLOs	Course Learning Outcomes statements	Knowledge Level (According to Bloom's Taxonomy)
CLO 1	know the basic knowledge of aromaticity, aromatic electrophilic substitution	K1 to K3
CLO 2	Compare the properties of aromatic , aliphatic alcohols	K1 to K3
CLO 3	Provide detailed chemistry about halogen family and its applications	K1 to K4
CLO 4	Apply concepts of catalysis in research field	K1 to K3
CLO 5	Studies about kinetics and its theories can solve the problems related to kinetics	K1 to K4

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	1	2	3	1
CLO2	3	2	1	2	3	1
CLO3	3	3	2	2	3	1
CLO4	3	3	2	2	3	1
CLO5	3	3	3	2	3	1

1-Basic Level 2- Intermediate Level 3- Advanced Level

Annexure-18

LESSON PLAN: TOTAL HOURS (60 Hrs)

Unit	Description	Hours	Mode
I	Aromaticity - definition - Huckel's rule - consequence of aromaticity - stability, carbon carbon bond lengths in benzene ring, resonance energy reactions of aromatic.	4	Chalk and Talk, PPT
	Aromatic electrophilic substitution - mechanism of nitration, halogenation, sulphonation, mercuration and Friedel-Crafts reaction - Energy profile diagrams - Activating and deactivating substituents - orientation in mono substituted benzenes	5	Chalk and Talk, PPT
	Reactions of aromatic side chain - halogenation and oxidation - Methods of formation and chemical reactions of alkylbenzenes, naphthalene and Anthracene	3	Chalk and Talk, PPT
II	Alcohols: Preparation from alkenes by hydration, hydroboration-oxidation and oxymercuration- demercuration methods – general properties. Ethylene glycols:Preparation, properties and uses-Glycerol: Preparation, properties and uses.	4	Chalk and Talk, PPT
	Phenols: General methods of Preparation – properties- acidity of phenol and effect of substitutents- reactions of analytical importance. c) Aromatic alcohol: Benzyl alcohol- Preparation and properties-comparison with phenols.	4	Chalk and Talk, PPT, group discussion
III	Halogen compounds: Electronic configuration, diatomic nature, oxidizing property, electronegativity and electron affinity – Difficulties in the discovery and isolation of fluorine – peculiarities of fluorine – electropositive character of Iodine	6	Chalk and Talk, PPT
	Interhalogen Compounds: Interhalogen compounds: preparation, properties of ClF, ICl, ClF_3, BrF_3, ICl_3, ClF_5, BrF_5 ,IF_5, IF_7 – structure of ICl, ClF_3, IF_5, IF_7- poly halides and pseudo halogens.	6	Chalk and Talk, PPT,Quiz
IV	Catalysis: Definition – characteristics of catalytic reactions – Homogeneous catalysis: Acid-base catalysis-enzyme catalysis-Michaelis-Menten equation-autocatalysis- Heterogeneous catalysis – surface catalytic reactions	4	Chalk and Talk, PPT and Seminar
	Promoters- catalytic poison – theories of catalysis – applications of catalysis. b) Adsorption: Definition – various terms involved in adsorption – types of adsorption: physical and chemical adsorption	4	Chalk and Talk

	Factors influencing adsorption – Adsorption Isotherms Freundlich adsorption isotherm and Langmuir adsorption isotherm (no derivation) - applications of adsorption.	4	Chalk and Talk, PPT
V	Introduction – rate of reaction – rate law and rate constant – order and molecularity – first order reactions – examples – rate equation – derivation – half life period	5	Chalk and Talk, PPT
	Second order reactions - examples – rate equations – derivation - zero order and third order reactions - examples – rate equations (no derivation required) - determination of order of a reaction. Influence of temperature on the rate of reaction	5	Chalk and Talk
	Arrhenius rate equation and its significance – theory of reaction rates – Bimolecular collision theory-- derivation of rate constant of a bimolecular reaction - comparison between ARRT and CT – Lindemann theory of unimolecular reaction – Theory of absolute reaction rate.	6	Chalk and Talk, PPT
	Total hours	60	

Course Designers: Dr.(Mrs).P.Bhuvaneswari

Mrs.V.Gokilaa

Annexure-18

Department of Chemistry					Class: II B.Sc			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/ Week**	**CIA**	**SE**	**Total**
III& IV	Core	22OUCH4P	Volumetric Analysis	2	2	40	60	100
Nature of the Course								
Knowledge and Skill Oriented			Employability Oriented		Entrepreneurship Oriented			
✓			✓					

II) Volumetric Analysis:

List of Experiments:

I. Acidimetry and alkalimetry: 1. Estimation of NaOH

2. Estimation of Na_2CO_3

3. Estimation of oxalic acid

II. Redox Titrations:

a) Permanganometry: 1. Estimation of ferrous ion

2. Estimation of oxalic acid

b) Dichrometry: 1. Estimation of ferrous ion

III. Iodometry and iodimetry

1. Estimation of potassium dichromate

2. Estimation of potassium permanganate

iv) Complexometry

Determination of permanent and temporary hardness of water sample (Demo only)

Books for References:

1. Venkateswaran.V, Veeraswamy.R, Kulandaivelu.A.R., (2012*),"Basic Principles of Practical Chemistry",* 2nd Edition, Sultan Chand & Sons, New Delhi
2. Mendham J., Denney R. C., Barnes J. D., Thomas M., Sivasankar B., (2000)"*Vogel's Textbook of Quantitative Chemical Analysis*," 6th edn, Pearson Education Ltd., New Delhi.
3. Mukhopadhyay R., Chatterjee P., (2007), "*Advanced Practical Chemistry*," 3rd Edition, Books and Allied Pvt., Kolkata.

Web Resources/e-books:

1. **http://allcomputerprograms.blogspot.com/2011/09/estimation-of-ferrous-iron-redox.html**
2. **https://byjus.com/chemistry/titration-of-oxalic-acid-with-kmno4/**

3. https://byjus.com/chemistry/titration-of-hydrochloric-acid-against-standard-sodium-carbonate/
4. https://byjus.com/jee/hardness-of-water-types-and-removal/

Pedagogy

Chalk and Talk, Group Discussion, Data interpretation and Demonstration

LESSON PLAN: TOTAL HOURS (60 Hrs)

S.No	Description	Hrs	Mode
1	Instructions	3	Chalk and Talk, Group discussion
2	Acidimetry and alkalimetry	4	Demonstration, Data interpretation
	Estimation of NaOH	3	Discussion, Data interpretation
	Estimation of Na_2CO_3	3	Discussion, Data interpretation
	Estimation of oxalic acid	3	Discussion, Data interpretation
	Permanganometry	4	Demonstration, Data interpretation
3	Estimation of ferrous ion	3	Discussion, Data interpretation
4	Estimation of oxalic acid	3	Discussion, Data interpretation
5	Dichrometry	4	Demonstration, Data interpretation
6	Estimation of ferrous ion	3	Discussion, Data interpretation
7	Iodometry and iodimetry	4	Demonstration, Data interpretation
8	Estimation of potassium dichromate	3	Discussion, Data interpretation
9	Estimation of potassium permanganate	3	Discussion, Data interpretation
10	Complexometry: Determination of permanent and temporary hardness of water sample	4	Demonstration, Data interpretation
11	Revision	4	
12	Model Exam	9	
	Total	60	

Course Designers: Mrs.V.Gokilaa

Dr.(Mrs).P.Bhuvaneswari

EVALUATION (PRACTICAL)

Internal (Formative) : 40 marks

External (Summative) : 60 marks

Total :100 marks

Question Paper Pattern for Internal Practical Examination: 40 Marks

S.No	Components	Marks
1.	Experiment	10
2	Procedure	10
3.	Model Exam	10
4.	Viva	5
5.	Observation Book	5
	Total	**40**

Question Paper Pattern for External Practical Examination (Major): 60 Marks

S.No	Components	Marks
1.	Experiment	30
2	Procedure	10
3.	Viva	10
4.	Record Book	10
	Total	**60**

Distribution of marks for External

Estimation (30 marks)

Error <2% - 30 marks

Error 2-3% -25 marks

Error 3-4% -20 marks

Error >4% -10 marks

In respect of external examinations passing minimum is **35% for Under Graduate** Courses and in total, **aggregate of 40%.**

Latest amendments and revisions as per **UGC** and **TANSCHE** norm is taken into consideration to suit the changing trends in the curriculum.

Annexure-18

Department of Chemistry					Class: II B.Sc N&D			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/ Week**	**CIA**	**SE**	**Total**
III	Generic Elective	22OUNDGECH3	Bio Chemistry	4	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
✓		

Course Objectives:

1. To enable the students to understand the fundamental concepts of amino acids and proteins
2. To provide knowledge about vitamins and harmones.
3. To build on their knowledge of genetic information in DNA and RNA and its biological aspects.
4. To gain knowledge the principle of enzymes and factor influencing of enzyme activity.
5. To understand the fats are an essential components of homeostatic function of the human body.

Course Content:

UNIT-I: Amino acids and Proteins: a) Amino acids: Definition- classification- synthesis of α-amino acid (Gabriel synthesis, Koop synthesis and Strecker synthesis)- properties of amino acids (isoelectric point, decarboxylation, acylation, action of heat, peptide formation). b) Proteins: Definition- classification (simple and conjugated proteins)- structure of proteins (primary, secondary, tertiary and quaternary)- properties of proteins (Dipolar or Zwitterr ions, colloidal nature, isoelectric point, denaturation, hydrolysis)- color tests for proteins (biuret test, ninhydrin test).

UNIT- II: Vitamins and Hormones: a) Vitamins: Definition-classification- source- function and deficiency disease of vitamins A, B complex, C, D, E and K. b) Hormones: Definition- classification- main functions of following hormones- Adrenaline, Cortisone, Testosterone, Estrone, Insulin, pituitary hormones, and thyroxin- differences between hormones and vitamins.

UNIT-III: Nucleic acids: Definition-Classification of nucleic acid- nucleosides- nucleotides- function of nucleotides- nucleotide as energy carriers- structure of DNA- replication of DNA-

functions of DNA-structure and functions of RNA- difference between DNA and RNA.

UNIT-IV: Enzymes: Definition –properties- classification-Co factors and coenzyme- mechanism of enzyme action- factors influencing enzyme activity- enzyme action-enzyme inhibition (competitive inhibitor, non-competitive inhibitor and end product inhibition)- role of enzymes in the digestion of food.

UNIT- V: Fats: Introduction- classification-composition of fats - extraction and refining of fats-properties (saponification, hydrogenation, rancidity) -analysis of fats (saponification value, acid value, iodine value, Reichert-Meisel value) - uses of fats.

Books for Study:

1. Arun Bahl & Bahl B.S., (2012), "*Advanced Organic Chemistry*", S.Chand & Company Ltd., New Delhi.
2. Soni P.L. & Chawla H.M., (2012), *"Text Book of Organic Chemistry*", Sultan Chand & Sons, New Delhi.
3. Veerakumar. L., (2019), "*Biochemistry*", MJP publishers, Chennai.

Books for Reference:

1. Lehniger, (2021), "*Principles of Biochemistry*", David L.Nelson and Michael M.Cox, Worth Publishers, 4th Edition, New York.
2. Tewari K.S & Vishnoi N.K., (2017), *"A Text Book of Organic Chemistry",*Vikas Publishing House Private Ltd, 4th Edition, New Delhi.
3. Soni P.L. & Chawla H.M., (2012), "*Text Book of Organic Chemistry*", Sultan & Sons, New Delhi.
4. Satyanarayana.U & Chakrapani.U, (2022), "*Biochemistry*", Elsvier.

Web Resources/e-books:

1. https://web.pdx.edu/~wamserc/C336S09/Wade_Ch24.pdf
2. file:///D:/ramya/carbohydrates%20notes.pdf
3. https://biochem.zsmu.zp.ua/wp-content/uploads/2017/04/Biochemistry-of-hormones.pdf
4. https://application.wiley-vch.de/books/sample/3527316035_c01.pdf
5. https://core.ac.uk/download/pdf/326762891.pdf

Pedagogy: Chalk and Talk method, Power point Presentations, Seminar, Group Discussion, Quiz through ICT-Mode

Rationale for nature of Course:

Knowledge and Skill: Students gain the knowledge on biological importance of amino acid and proteins, Vitamins and Harmones, Nucleic acid, Enzymes and Fats. Having skills in laboratorial color test for proteins (Ninhydrin and Biuret test).

Activities to be given:

1. To frame the structure of DNA and RNA.
2. To find out the enzymes in biological systems of humans.
3. To identify colors of proteins by Ninhydrin and Biuret test in laboratory

Course Learning Outcomes (CLOs)

CLOs	Course Learning Outcomes statements	Knowledge Level (According to Bloom's Taxonomy)
CLO 1	Draw and illustrate the structure of amino acid and proteins.	K1 to K3
CLO 2	Identify the structure of vitamins and functions of vitamins and harmones.	K1 to K3
CLO 3	State nucleic acid.Ecplain the structure and function of DNA and RNA	K1 to K4
CLO 4	Identify the enzymes are biological catalysts and discuss the factors affecting enzyme activity	K1 to K3
CLO 5	Recognize the metabolism of fat and chemical reactions	K1 to K4

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3- Application oriented- Solving Problems
K4- Examining, analyzing, presentation and make inferences with evidences

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	1	2	3	1
CLO2	3	2	1	2	3	1
CLO3	3	2	2	2	2	1
CLO4	3	3	2	2	3	1
CLO5	3	3	2	2	3	1

1-Basic Level 2- Intermediate Level 3- Advanced Level

Annexure-18

LESSON PLAN: TOTAL HOURS (60Hrs)

Unit	Description	Hours	Mode
I	a) Amino acids: Definition- classification- synthesis of α-amino acid (Gabriel synthesis, Koop synthesis and Strecker synthesis)	3	Chalk and Talk, PPT
	Properties of amino acids (isoelectric point, decarboxylation, acylation, action of heat, peptide formation).b) Proteins: Definition-classification (simple and conjugated proteins)- structure of proteins (primary, secondary, tertiary and quaternary)-	6	Chalk and Talk, PPT
	Properties of proteins (Dipolar or Zwitterr ions, colloidal nature, isoelectric point, denaturation, hydrolysis)- color tests for proteins (Biuret test, Ninhydrin test).	3	Chalk and Talk, PPT, Quiz
II	Vitamins: Definition-classification- source- function and deficiency disease of vitamins A, B complex, C, D, E and K.	5	Chalk and Talk, PPT
	Hormones: Definition- classification- main functions of following hormones- Adrenaline, Cortisone, Testosterone, Estrone, Insulin, pituitary hormones, and thyroxin- differences between hormones and vitamins.	7	Chalk and Talk, PPT, group discussion
III	Definition-Classification of nucleic acid- nucleosides- nucleotides- function of nucleotides- nucleotide as energy carriers	7	Chalk and Talk, PSPT
	Structure of DNA- replication of DNA- functions of DNA-structure and functions of RNA- difference between DNA and RNA.	7	Chalk and Talk, PPT,
IV	Definition –properties- classification-Co factors and coenzyme	4	Chalk and Talk, PPT and Seminar
	Mechanism of enzyme action- factors influencing enzyme activity-enzyme action-enzyme inhibition (competitive inhibitor, non-competitive inhibitor and end product inhibition)- role of enzymes in the digestion of food.	8	Chalk and Talk, PPT
V	Introduction- classification-composition of fats - extraction and refining of fats-	4	Chalk and Talk, PPT
	Properties (saponification, hydrogenation, rancidity) -analysis of fats (saponification value, acid value, iodine value, Reichert-Meisel value) - uses of fats.	6	Chalk and Talk, PPT
	Total Hours	60	

Course Designers: Dr.(Mrs).A.Ramya

Ms.K.Punitha

Department of Chemistry					Class: II B.Sc., N&D			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/ Week**	**CIA**	**SE**	**Total**
IV	Generic Elective	22OUNDGECH4	Environmental and Organic Chemistry	4	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
✓		

Course Objectives:

1. To learn about environmental pollution and causes.
2. To learn waste management and recycling of water.
3. To gain the knowledge about radioactive pollution and anthropogenic sources of radiation.
4. To study about glucose, fructose and sucrose.
5. To provide the knowledge about dyes.

Course Content:

UNIT-I: Environmental Pollution: Definition –types of pollution- Causes, effect and control measures of air pollution (Greenhouse effect, Global warming, acid rain) - water pollution – Causes, effect and control measures.

UNIT- II: Waste Treatment/Management: Waste classification – Solid waste disposal, Solid waste management – Waste water treatment (domesticprocess–aerobicprocess– industrialprocess– reverse osmosis process)-reuse and recycling of water**.**

UNIT-III: Radioactive pollution, protection and control from radiations: anthrapogenicsoures of radiation – control of occupational radiation exposure – minimizing X-rays hazards – patient protection from radiation –radiography and precautions from radiation risk-minimizing risks of nuclear power- beneficial aspects of radiation.

UNIT-IV: Carbohydrates: Definition and classification-detailed study of monosaccharides-glucose and fructose-mutarotation-epimerisation-structure and properties of glucose and fructose-comparison between glucose and fructose-methods of ascending and descending in the sugar series-interconversion between glucose and fructose-disaccharides-sucrose-preparation, properties (no structural elucidation).

UNIT-V: Dyes: Introduction to dyes – color and constitution – classification based on structure and application – preparation and applications of the following dyes –Nitro Dyes, Azo Dyes-methylorange, congo red, malachite green, phenolphthalein, Indigo and fluorescein. Raw materials for manufacturing of dyes.

Books for Study:

1. De A.K., (2018), "*Environmental Chemistry*", New Age, 9th Edition, New Delhi.
2. Sharma B.K., (2019), *"Environmental Chemistry*", Goel Publishing House, Meerut.
3. Soni P.L. & Chawla H.M., (2012), "*Text Book of Organic Chemistry*", Sultan & Sons, New Delhi.
4. Soni P.L. & Chawla H.M., (2012) *"Text Book of Organic Chemistry*", Sultan Chand & Sons, New Delhi.
5. Arun Bahl & Bahl B.S., (2012) "*Advanced Organic Chemistry*", S.Chand & Company Ltd., New Delhi.

Books for Reference:

1. Ignacimuthu S.J., (2012), "*Environmental Studies*", MJP Publishers, Chennai.
2. Bhupindu Mehta, Manjal Mehta, (2012), "*Organic Chemistry*", PHI Learning Private Limited, New Delhi.
3. Tewari K.S. & Vishnoi N.K., (2017),*"A Text book of Organic Chemistry*", Vikas Publishing House Pvt. Ltd., New Delhi.
4. Dara S.S. & Umare.S.S, (2018), "*A Textbook of Engineering Chemistry*", S.Chand & Company Ltd., New Delhi.

Web Resources/e-books:

1. https://www.bbau.ac.in/dept/UIET/TCE-033%20%20epdf.pub_environmental-pollution-and-control.pdf
2. http://cbs.teriin.org/pdf/Waste_Management_Handbook.pdf
3. http://jiwaji.edu/pdf/ecourse/env_science/Radio%20Active%20pollution.pdf
4. https://www-pub.iaea.org/mtcd/publications/pdf/pub1229_web.pdf
5. http://dhingcollegeonline.co.in/attendence/classnotes/files/1601573352.pdf
6. https://www.sathyabama.ac.in/sites/default/files/course-material/2020-10/note_1456404597.pdf

Pedagogy: Chalk and Talk method, Power point Presentations, Seminar, Group Discussion, Quiz through ICT-Mode

Rationale for nature of Course:

Knowledge and Skill: This course offers students a theoretical understanding of environmental pollution, waste water treatment process different types of radioactive pollution in minimizing X-ray hazards, carbohydrates and dyes.

Activities to be given:

To identify different dyes used in textile industries and make a documentation.

Course Learning Outcomes (CLOs)

CLOs	Course Learning Outcomes statements	Knowledge Level (According to Bloom's Taxonomy)
CLO 1	Identify the types of pollutants in addition to air and water	K1 to K3
CLO 2	Illustrate the basic concept of solid waste management, beginning from source generation to waste disposal.	K1 to K3
CLO 3	Recognize the radioactive pollutions and explain anthrapogenic source of radiations	K1 to K4
CLO 4	Illustrate the function of carbohydrates in the body	K1 to K3
CLO 5	Identify the structure of dyes. Discuss the applications of dyes	K1 to K4

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3- Application oriented- Solving Problems
K4- Examining, analyzing, presentation and make inferences with evidences

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	1	2	3	1
CLO2	3	2	1	3	3	1
CLO3	2	3	2	3	2	1
CLO4	3	3	2	2	3	1
CLO5	2	3	2	3	2	1

1-Basic Level 2- Intermediate Level 3- Advanced Level

Annexure-18

LESSON PLAN: TOTAL HOURS (60Hrs)

Unit	Description	Hours	Mode
I	Definition –types of pollution- Causes, effect and control measures of air pollution(Greenhouse effect, Global warming, acid rain)	5	Chalk and Talk, PPT
	Water pollution – Causes, effect and control measures.	4	Chalk and Talk, PPT
II	Waste classification – Solid waste disposal, Solid waste management –	5	Chalk and Talk, PPT
	Waste water treatment (domesticprocess–aerobicprocess–industrialprocess–reverse osmosis process)-reuse and recycling of water.	6	Chalk and Talk, PPT, group discussion
III	Anthrapogenicsoures of radiation – control of occupational radiation exposure – minimizing X-rays hazards – patient protection from radiation	7	Chalk and Talk, PPT
	–radiography and precautions from radiation risk- minimizing risks of nuclear power- beneficial aspects of radiation.	6	Chalk and Talk, PPT,
IV	Definition and classification-detailed study of monosaccharides-glucose and fructose-	4	Chalk and Talk, PPT and Seminar
	mutarotation-epimerisation-structure and properties of glucose and fructose-comparison between glucose and fructose-methods of ascending and descending in the sugar series	5	Chalk and Talk, PPT
	Interconversion between glucose and fructose-disaccharides-sucrose-preparation, properties(no structural elucidation).	5	Chalk and Talk, PPT
V	Introduction to dyes – color and constitution – classification based on structure and application – preparation and applications of the following dyes –Nitro Dyes	6	Chalk and Talk, PPT
	Azo Dyes- methylorange, congo red, malachite green, phenolphthalein, Indigo and fluorescein. Raw materials for manufacturing of dyes.	7	Chalk and Talk, PPT
	Total Hours	60	

Course Designers: Dr.(Mrs)A.Ramya

Ms.K.Punitha

Department of Chemistry					Class: II B.Sc., Physics			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/ Week**	**CIA**	**SE**	**Total**
III	Generic elective	22OUPHGECH3	Physical Chemistry	4	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
✓		

Course Objectives:

1. To under the basic concept of gaseous state
2. To study the concepts of structure of solids
3. To understand Adsorption and catalysis.
4. To learn about rate, order and theories of reaction rate
5. To acquire knowledge about fundamentals of photochemistry

Course Content:

UNIT-I: Gaseous State: a) Ideal gases: Kinetic theory of ideal gases - gas laws - ideal gas equation -Definition of most probable velocity - Mean velocity - RMS velocity - Collision diameter -collision cross section - collision frequency -Mean free path.b) Real gases: Deviation from ideal behaviour - Derivation of vanderwaal's equation - Methods of liquefaction of gases - Joule Thomson effect - Inversion temperature.

UNIT- II : Structure of Solids: Introduction to solids – Crystalline and amorphous. Unit cell, Bravais lattices -X-ray diffraction by crystals, Bragg's equation -derivation. Ionic Crystals Analysis of sodium chloride, potassium chloride – powder and single crystal methods. Radius ratio rules – coordination number. Packing arrangement – different structure types in solids – rock salts, zinc blende, wurtzite.

UNIT-III : Adsorption and Catalysis: Definition-difference between adsorption and absorption adsorbate, adsorbent-physical adsorption-chemical adsorption-differences between these two types-factors influencing adsorption- adsorption of gases on solid surface adsorption-adsorption isotherm-Langmuir isotherm (no derivation, statement only). Catalysis: Definition-different types of catalysis-acid base catalysis-surface catalytic reactions-definition and examples- auto-catalyst - catalytic poisoning- promoters-enzyme catalysis-characteristics.

UNIT-IV: Chemical Kinetics: Chemical kinetics:Rate of the reaction- rate law- rate constant- order and molecularity of reaction- differences between order and molecularity- derivation of rate constant and half life period for first order-examples for second order, third order reaction. Effect of temperature on reaction rate (Arrhenius theory of reaction rate)

UNIT-V: Photochemistry: i) Definition of photochemical reaction-differences between thermal and photochemical reactions-laws of photochemistry [Lambert, Beer's law and Stark-Einstein's law]-quantum yield-explanation of low and high quantum yield-experimental determination of quantum yield**.**ii) Jablonski diagram, Non-radiative transition(IC and ISC) and radioactive transition (Fluorescence and Phosphoresence) – differences between fluorescence and phosphorescence. iii) Photosensitization –chemiluminescence and bioluminescence.

Books for Study:

1. Puri, Sharma, & Pathania, (2004), "*Principles of Physical Chemistry*," Vishal Publishing Co, Jalandhar.
2. Rohatgi-Mukherjee K.K., (2011),"*Fundamentals of Photochemistry",* New age international Pvt., New Delhi.

Books for Reference:

1. Soni P.L., Dharmarha O.P., and Dash.U.N (2011), "*Text Book of Physical Chemistry*", 23rd Edition, Sultan Chand & Sons, New Delhi.
2. Soni P.L., (2000), "*Text book of Inorganic Chemistry"*, 20th edn, Sultan Chand& Sons,
3. Bajbhai D.N., (2010), "*Advanced Physical Chemistry*", S.Chand & Company, New Delhi,
4. Madan R. D., (2014), "*Modern Inorganic Chemistry*," 3rd Revised Edition, S. Chand & Company Ltd., New Delhi.

Web Resources/e-books:

1. https://rcub.ac.in/econtent/ug/bsc/2ndsem/BSc%20Sem%20II%20Physics%20Kinetic%20theory%20of%20gases.pdf
2. https://www.physics.udel.edu/~yji/PHYS624/Chapter3.pdf
3. https://stannescet.ac.in/cms/staff/qbank/CSE/Notes/CY8151-Engineering%20Chemistry-431878289-unit_2%20(1).pdf
4. https://www.unf.edu/~michael.lufaso/chem2046/2046chapter14.pdf
5. https://courseware.cutm.ac.in/wp-content/uploads/2020/05/photochemistry-2.pdf

Pedagogy:

Chalk and Talk method, Power point Presentations, Seminar, Group Discussion, and Quiz through ICT-Mode

Rationale for nature of Course:

Knowledge and Skill:

This course will enable the students to acquired knowledge about gaseous State, Structure of Solids, Adsorption and Catalysis and Chemical Kinetics.

Activities to be given:

1. Construct the crystal structure using Avogadro software
2. Power point presentation on adsorption

Course Learning Outcomes (CLOs)

CLOs	Course Learning Outcomes statements	Knowledge Level (According to Bloom's Taxonomy)
CLO 1	Recognize kinetic theory of ideal gases, gas laws, Vanderw-aal's equation	K1 to K3
CLO 2	Derive the X-ray diffraction by crystals Bragg's equation derivation.	K1 to K3
CLO 3	differences between these two types-factors influencing adsorption adsorption isotherm-Langmuir isotherm	K1 to K4
CLO 4	Explain chemical kinetics: Rate of the reaction rate law rate constant.	K1 to K3
CLO 5	Definition of photochemical reaction-differences between thermal and photochemical reactions	K1 to K4

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

Annexure-18

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	1	2	3	1
CLO2	3	2	1	2	3	1
CLO3	3	3	2	2	3	1
CLO4	3	3	2	2	3	1
CLO5	3	3	3	2	3	1

1-Basic Level 2- Intermediate Level 3- Advanced Level

LESSON PLAN: TOTAL HOURS (60Hrs)

Unit	Description	Hours	Mode
I	a) Ideal gases: Kinetic theory of ideal gases - gas laws - ideal gas equation -Definition of most probable velocity	3	Chalk and Talk
	Mean velocity - RMS velocity - Collision diameter -collision cross section - collision -frequency -Mean free path	4	Chalk and Talk
	b) Real gases: Deviation from ideal behavior - Derivation of vanderwaal's equation - Methods of liquefaction of gases - Joule Thomson effect - Inversion temperature.	3	Chalk and Talk, PPT
II	Introduction to solids – Crystalline and amorphous. Unit cell, Bravais lattices -X-ray diffraction by crystals , Bragg's equation - derivation. Ionic Crystals Analysis of sodium chloride, potassium chloride	7	Chalk and Talk
	Powder and single crystal methods. Radius ratio rules – coordination number. Packing arrangement – different structure types in solids – rock salts, zinc blende, wurtzite.	5	Chalk and Talk, Quiz
III	Definition-difference between adsorption and absorption adsorbate, adsorbent-physical adsorption-chemical adsorption-differences between these two types-factors influencing adsorption-adsorption isotherm-Langmuir isotherm (no derivation, statement only) adsorption of gases on solid surface.	7	Chalk and Talk, Seminar

	Catalysis: Definition-different types of catalysis-acid base catalysis-surface catalytic reactions-definition and examples- auto-catalyst - catalytic poisoning- promoters-enzyme catalysis-characteristics	7	Chalk and Talk
IV	Chemical kinetics:Rate of the reaction- rate law- rate constant- order and molecularity of reaction- differences between order and molecularity.	4	Chalk and Talk
	Derivation of rate constant and half life period for first order-examples for second order, third order reaction. Effect of temperature on reaction rate (Arrhenius theory of reaction rate)	6	Chalk and Talk
V	Definition of photochemical reaction-differences between thermal and photochemical reactions-laws of photochemistry [Lambert, Beer's law and Stark-Einstein's law]-quantum yield	4	Chalk and Talk
	Explanation of low and high quantum yield-experimental determination of quantum yield.ii) Jablonski diagram, Non-radiative transition(IC and ISC) and radioactive transition (Fluorescence and Phosphoresence)	4	Chalk and Talk
	Differences between fluorescence and phosphorescence. iii) Photosensitization –chemiluminescence and bioluminescence.	6	Chalk and Talk
	Total Hours	60	

Course Designers: Mrs.V.Gokilaa

Dr.(Mrs).P.Bhuvaneswari

Annexure-18

Department of Chemistry					Class: II B.Sc., Physics			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/ Week**	**CIA**	**SE**	**Total**
IV	Generic elective	22OUPHGECH4	Organic and Physical Chemistry	4	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
✓		

Course Objectives

1. To understand the importance of amino acids and proteins.
2. To get fundamental concept of glucose, fructose and sucrose.
3. To understand the importance of nuclear chemistry.
4. To gain knowledge of electrochemistry.
5. To understand the nature of colloids.

Course Content:

UNIT – I: Amino acids and Proteins: a) Amino acids: Definition- classification- synthesis of α-amino acid (Gabriel synthesis, Koop synthesis)- properties of amino acids (isoelectric point, action of heat, peptide formation).b) Proteins: Definition- classification (simple and conjugated proteins)- properties of proteins (colloidal nature, isoelectric point, denaturation, hydrolysis)- color tests for proteins (Biuret test, Ninhydrin test)- structure of proteins (primary, secondary, tertiary and quaternary).

UNIT – II: Carbohydrates: Definition and classification-detailed study of monosaccharides-glucose and fructose-mutarotation-epimerisation-structure of glucose and fructose-comparison between glucose and fructose-methods of ascending and descending in the sugar series-interconversion between glucose and fructose-disaccharides-sucrose-preparation, properties and structure elucidation.

UNIT – III: Nuclear Chemistry: a) Composition of the nucleus -nuclear forces-mass defect-binding energy-nuclear stability. b) Soddy's group displacement law-illustration-law of radioactive disintegration. c) Nuclear fission: Definition-theories of fusion-application of fission-the principle of atom bomb. d) Nuclear fusion: Definition-emission of energy-stellar energy-hydrogen bomb. e) Application of radioactivity-In medicine, agriculture, industry and analytical fields-carbon dating.

UNIT – IV: Electrochemistry: Electrochemistry: Faraday's law of electrolysis-specific and equivalent conductance-electrochemical cell-Nernst equation-convention regarding the sign of EMF of a cell-electrodes-reference electrodes-hydrogen and calomel electrodes-types of electrodes-metal-metal ion electrodes-metal-metal insoluble salt electrodes-glass and ion selective electrodes-pH measurement using glass electrode-membrane potential-hydrogen-oxygen fuel cell.

UNIT-V- Colloids: Definition - size of colloidal particles –classification- sols - preparation of sols by mechanical dispersion Method and Bredig's arc method. properties: Optical property-Tyndall effect, kinectic property-Brownian movement –electro kinetic properties- electrophoresis. Purification of colloidal solution –dialysis - Emulsion: Types of emulsions-emulsifier with examples- Gels: Classification, preparation - Application of colloids.

Books for Study:

1. Bahl B.S. & Arun Bahl, (2008) ,"*Advanced Organic Chemistry*", S.Chand & Company New Delhi.
2. Soni P.L. & Chawla H.M., (2004), "*Text Book of Organic Chemistry*", Sultan & Sons, New Delhi.
3. Puri, Sharma, Pathania, (2004), "*Principles of Physical Chemistry*," Vishal Publishing Co, Jalandhar.

Books for Reference:

1. Bansal K, (2012). "*Organic Reaction Mechanisms*", 4th Edition, New Age International Pvt. Ltd., New Delhi.
2. Bhupinder Mehta, Manjal Mehta, (2012), "*Organic Chemistry*", PHI Learning Private Limited, New Delhi.
3. Tewari K.S. Mehrotra S.N. & Vishnoi N.K., (2001), *"A Text book of Organic Chemistry*", Vikas Publishing House Pvt. Ltd., New Delhi.
4. Viswanathan B. Venkataraman R. & Rengarajan K., (2007), "*Electro Chemistry*", S.Viswanathan Pvt. Ltd., Chennai.

Web Resources/e-books:

1. https://global.oup.com/us/companion.websites/fdscontent/uscompanion/us/static/companion.websites/9780199730841/McKee_Chapter5_Sample.pdf
2. https://basu.org.in/wp-content/uploads/2020/10/Carbohydrates.pdf
3. https://laney.edu/huisunkim/wp-content/uploads/sites/407/2017/08/30A-Ch17-Nuclear-

Chemistry.pdf

4. https://personal.utdallas.edu/~son051000/chem1312/Chapter18a.pdf
5. https://www.lkouniv.ac.in/site/writereaddata/siteContent/20200407094826309 8nksingh_Colloidal_State.pdf

Pedagogy:

Chalk and Talk method, Power point Presentations, Seminar, Group Discussion, Quiz through ICT-Mode

Rationale for nature of Course:

Knowledge and Skill: This course will enable the students to acquired knowledge about Amino acids and Proteins, Carbohydrates, Nuclear Chemistry, Electrochemistry and Colloids.

Activities to be given:

1. Poster presentation on nuclear fusion and fission reactions
2. To identify colors of proteins by Ninhydrin and Biuret test in laboratory

Course Learning Outcomes (CLOs)

CLOs	Course Learning Outcomes statements	Knowledge Level (According to Bloom's Taxonomy)
CLO 1	Outline the concept of properties and structure of amino acids and proteins .	K1 to K3
CLO 2	Compare the properties of glucose fructose and sucrose.	K1 to K3
CLO 3	Explain about nuclear fission and fusion reactions.	K1 to K4
CLO 4	State the Electrochemistry and explain the Faraday's law of electrolysis.	K1 to K3
CLO 5	Discuss the colloidal particles and classification of sols.	K1 to K4

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

Annexure-18

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	1	2	3	1
CLO2	3	2	1	2	3	1
CLO3	3	3	2	2	3	1
CLO4	3	3	2	2	3	1
CLO5	3	3	3	2	3	1

1-Basic Level 2- Intermediate Level 3- Advanced Level

LESSON PLAN: TOTAL HOURS (60Hrs)

Unit	Description	Hours	Mode
I	a) Amino acids: Definition- classification- synthesis of α-amino acid (Gabriel synthesis, Koop synthesis)	3	Chalk and Talk
	Properties of amino acids (isoelectric point, action of heat, peptide formation).b) Proteins: Definition- classification (simple and conjugated proteins)	4	Chalk and Talk
	Properties of proteins (colloidal nature, isoelectric point, denaturation, hydrolysis)- color tests for proteins (biuret test, ninhydrin test)- structure of proteins (primary, secondary, tertiary and quaternary).	3	Chalk and Talk
II	Definition and classification-detailed study of monosaccharides-glucose and fructose-mutarotation-epimerisation-structure of glucose and fructose-comparison between glucose and fructose	5	Chalk and Talk
	Methods of ascending and descending in the sugar series-interconversion between glucose and fructose-disaccharides-sucrose-preparation, properties and structure elucidation.	7	Chalk and Talk
III	a) Composition of the nucleus -nuclear forces-mass defect-binding energy-nuclear stability. b) Soddy's group displacement law-illustration-law of radioactive disintegration.	7	Chalk and Talk
	c) Nuclear fission: Definition-theories of fusion-application of fission-the principle of atom bomb. d) Nuclear fusion: Definition-emission of energy-stellar energy-hydrogen bomb. e) Application of	7	Chalk and Talk

	radioactivity-In medicine, agriculture, industry and analytical fields-carbon dating.		
IV	Electrochemistry: Faraday's law of electrolysis-specific and equivalent conductance-electrochemical cell-Nernst equation-convention regarding the sign of EMF of a cell	4	Chalk and Talk, PPT and Seminar
	Reference electrodes-hydrogen and calomel electrodes-types of electrodes-metal-metal ion electrodes-metal-metal insoluble salt electrodes-	6	Chalk and Talk, PPT and Virtual Lab.
	metal-metal ion electrodes-metal-metal insoluble salt electrodes-glass and ion selective electrodes-pH measurement using glass electrode-membrane potential-hydrogen-oxygen fuel cell.	4	Chalk and Talk
V	Definition - size of colloidal particles –classification- sols - preparation of sols by mechanical dispersion Method and Bredig's arc method. properties: Optical property-tyndall effect ,kinectic property-brownian movement	4	Chalk and Talk
	Electro kinetic properties electrophoresis. Purification of colloidal solution –dialysis - Emulsion: Types of emulsions-emulsifier with examples- Gels: Classification, preparation - Application of colloids.	6	Chalk and Talk
	Total Hours	60	

Course Designers: Mrs.V.Gokilaa

Dr.(Mrs).P.Bhuvaneswari

Annexure-18

Department of Chemistry					Class: II B.Sc., N&D, Physics			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/ Week**	**CIA**	**SE**	**Total**
III& IV	Generic Elective	22OUNDGEC H4P/22OUPH GECH4P.	Inorganic Qualitative Analysis	1	2	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
✓	✓	

Inorganic Qualitative Analysis-Model Question

To analyze systematically the given simple salt containing one anion (acid radical) and one cation (basic radical). Record your observations as and when you make them.

Cations: Lead, Bismuth, Copper, Cadmium, iron (II &III), Aluminum, Zinc, Manganese, Cobalt, Nickel, Barium, Strontium, Calcium, Magnesium and Ammonium

Anions: Carbonate, Sulphate, Nitrate, Chloride, Bromide, Fluoride, Oxalate, Borate and Phosphate

Books for References:

1. Venkateswaran V., Veeraswamy R., Kulandaivelu A.R., (2012*),"Basic Principles of Practical Chemistry",* 2nd Edition, Sultan Chand & Sons, New Delhi.
2. Mala Nath, (2016),*"Inorganic Chemistry-A Laboratory Manual,"*Narosa Publishing House Pvt Ltd., New Delhi.

Web Resources/e -books:

1. http://www.iscnagpur.ac.in/study_material/dept_chemistry/4.1_MIS_and_NJS_Manual_for_Inorganic_semi-micro_qualitative_analysis.pdf
2. https://www.goodearthschool.org/admin/product_document/Chemistry---Inorganic-Qualitative-analysis.pdf
3. http://www.rbmcollege.ac.in/sites/default/files/files/reading%20material/inorganic-qualitative-analysis.pdf
4. https://books-library.net/files/books-library.online_noo7f92c9ed2bbcef1ddf21cc-47353.pdf
5. https://kresnadipayana.files.wordpress.com/2018/10/macro-and-semimicro-qualitative-inorganic-analysis-5ed-vogel.pdf

Pedagogy

Chalk and Talk, Group Discussion and Demonstration

LESSON PLAN: TOTAL HOURS (60 Hrs)

S.No	Description	Hrs	Mode
1	Instructions	2	Chalk and Talk, Demonstration
2	Analysis of Anion (Acid Radical)	4	Demonstration
	Analysis of Cation (Basic Radical)	4	Demonstration
3	Analysis of Anion	4	Chalk and Talk, Discussion
4	Analysis of Cation	4	Chalk and Talk, Discussion
5	Analysis of inorganic salt -I	5	Chalk and Talk, Discussion
6	Analysis of inorganic salt-II	5	Chalk and Talk, Discussion
7	Analysis of inorganic salt -III	5	Chalk and Talk, Discussion
8	Analysis of inorganic salt –IV	5	Chalk and Talk, Discussion
9	Analysis of inorganic salt -V	5	Chalk and Talk, Discussion
10	Analysis of inorganic salt-VI	5	Chalk and Talk, Discussion
11	Revision	6	
12	Model	6	
	Total	60	

Course Designers: Dr.(Mrs)A.Ramya

Mrs.V.Gokilaa

Annexure-18

EVALUATION (PRACTICAL)

Internal (Formative) : 40 marks

External (Summative) : 60 marks

Total :100 marks

Question Paper Pattern for Internal Practical Examination: 40 Marks

S.No	**Components**	**Marks**
1.	Acid Radical	10
2	Basic Radical	10
3.	Model Exam	10
4.	Viva	5
5	Observation Book	5
	Total	**40**

Question Paper Pattern for External Practical Examination (Major): 60 Marks

S.No	**Components**	**Marks**
1.	Acid Radical with procedure	20
2	Basic Radical with procedure	20
3.	Viva	10
4.	Record Book	10
	Total	**60**

In respect of external examinations passing minimum is **35% for Under Graduate** Courses and in total, **aggregate of 40%.**

Latest amendments and revisions as per **UGC** and **TANSCHE** norm is taken into consideration to suit the changing trends in the curriculum.