	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.						
Programme	**B.Sc**	Programme Code	**UCH**		Regulations	**2021-2022**	
Department	**Chemistry**		Semester			**1**	
Course Code	Course Name		Periods per Week		Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
21U1CHC01	**Core paper - I: General Chemistry –I**		6		0	6	25	75	100
Course Objectives	1. To learn about the fundamentals of chemistry and principles of various topics. 2. To learn about the outline of basic concepts of organic chemistry. 3. To critique errors and titrimetry.								
POs	**PROGRAMME OUTCOME**								
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.								
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.								
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.								
PO 4	Apply one's learning to real life situations.								
PO 5	Analyse and synthesis data from a variety of sources.								
PO 6	Establish hypothesis, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.								
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.								
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.								
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.								
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.								
PO 11	Ability to work independently, identify appropriate resources required for a project.								
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.								
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.								
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.								
PO 15	Ability to acquire knowledge and skills.								

COs	COURSE OUTCOME
CO 1	Students understand the various atom models, the periodic properties and electronic configurations of s p d and f block elements.
CO 2	Students gain an insight into the concept of valency and predict the formulas of compounds, sketch Lewi's structure, identify situations where and appreciation of dative bonding is required to account for bonding in molecules and ions.
CO 3	Students analyze the basic concepts or organic chemistry while learning about reactions.
CO 4	Students apply the different chemical concepts to different gaseous system and real time problems.
CO 5	Students evaluate the magnitude of various possible errors in volumetric analysis.
Pre-requisites	Nil

KNOWLEDGE LEVELS			
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing			
CO / PO / KL Mapping **(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)**			
Cos	KLs	POs	KLs
CO 1	1	PO 1	1
		PO 2	3
		PO 3	5
CO 2	3	PO 4	2
		PO 5	4
		PO 6	2
CO 3	2	PO 7	6
		PO 8	4
		PO 9	2
CO 4	4	PO 10	3
		PO 11	1
		PO 12	5
CO 5	3	PO 13	4
		PO 14	2
		PO 15	1

CO / PO Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**Programme Outcome (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	1	1	2	1	2	1	1	2	1	3	1	1	2	3
CO2	1	3	1	2	2	2	1	2	2	3	1	1	2	2	1
CO3	2	2	1	3	1	3	1	1	3	2	2	1	1	3	2
CO4	1	2	2	1	3	1	1	3	1	2	1	2	3	1	1
CO5	1	3	1	2	2	2	1	2	2	3	1	1	2	2	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Atomic& Electronic structure and Periodicity of Elements**	Periods	12
	Fundamental particles of matter – their composition – Comparison between Rutherford ‘s model of atom and Bohr ‘s Model-Outline of the Bohr-Sommerfeld model-its limitations - de Broglie theory-Heisenberg ‘s uncertainty principle- Concept and Shapes of orbital Differences between orbit andorbital.Quantum numbers and their significance, Pauli s exclusion principle, Hund’s rule, Aufbau principle, Extra stability of half -filled and completely filled orbital, Electronic configuration of atoms. Modern periodic law, Long form of periodic table, cause of periodicity, division of elements into s, p, d, and f blocks.Periodic properties - Factors affecting periodic properties- and its variation along the periods andthe groups.		
Unit - II	**Chemical Bonding**	Periods	12
	Ionic bond- Definition, examples – Formation - Factors influencing the formation of ionic bond- characteristics of ionic compounds- lattice energy and its determination using Born-Haber Cycle. Covalent bond- Definition, examples – Formation-factors influencing the formation of covalent bond- characteristics of covalent compounds -partial ionic character in covalent compounds - Polarizing power – Polrizability of ions - Fajan’s rule -Molecular orbital theory- Postulates - MO configuration of homo nuclear diatomic molecules- H_2, He_2, F_2, $O_2$and their ions -Hetero nuclear molecular orbital –BeF_2, CO and NO – Formal Charge -VSEPR theory- Postulates - explanation ofshapes of simple covalent molecules and ions.Weak chemical forces - van der Waals forces, ion-dipole forces, dipole-dipole interactions, induced dipole interactions, Instantaneous dipole-induced dipole interactions. Repulsive forces, Hydrogen bonding.		
Unit - III	**Fundamentals of Organic Chemistry**	Periods	12
	Concept of hybridization Structure of organic molecules based on sp^3, sp^2 and sp hybridization Covalent bond properties of organic molecules bond length, bond angle, bond energy, bond polarity, dipole moment. Physical Effects, Electronic Displacements: Inductive Effect, Mesomeric - Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis. Structure, shape and reactivity of organic molecules: Aliphatic nucleophilic substitution, aromatic electrophilic substitution reactions: Reactive Intermediates: Carbocations, Carbanions and free radicals. Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Benzenoids and Hückel’s rule.		

Unit - IV	**The Gaseous state and the Liquid state**	Periods	12
	A) **The Gaseous state** Postulates of kinetic theory of gases and its derivation -ideal gas equation, Boyle's law, Charles law, Grahams law of gaseous diffusion and Daltons law of partial pressure. Maxwells distribution of molecular velocities, Root mean square, average and most probable velocity, Collision diameter, collision frequency, collision number and mean free path - Deviations of real gases from ideal behavior Derivation of Vander Waals equation for real gases. B) **The Liquid state** Structure of liquids-Vapour pressure – Trouton's rule- Determination of Vapour pressure - dynamic and static method -Effect of temperature on vapour pressure -Surface tension-Surface energy surface active reagents – Viscosity-Effect of temperature on viscosity. Refractive index - Specific refraction - Molar Refraction Optical activity. Liquid crystals The mesomorphic state - classification of liquid crystal smectic-nematic and cholestric liquid crystals.		
Unit - V	**Error Analysis**	Periods	12
	Errors and its types Significant figure, Definitions of molarity, molality, normality and mole fraction. Titration - Back titration, Equivalence point indicator Standard solution, Primary and secondary standards - Types of titrations - Acid base and redox. Analysis of basic radicals - Group separation and confirmatory tests for basic radicals.		
Total Periods			60

Text Books	
1	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry (33rd edition), Vishal publishing Co (2017)
2	Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry, (47th edition), Vishal Publishing co., (2017)
3	Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (22nd edition), New Delhi, S Chand & Co (2016)
References	
1	Morrison R.T. and Boyd R.N., Organic Chemistry (7th Edition), Pearson Education, India (2010)
2	Madan. R. D., Inorganic Chemistry (3rd edition), New Delhi, S. Chand and Co (2012)
3	Mukherji. S. M, Singh. S. P, Kapoor. R.P, Organic Chemistry volume I (4th edition) New age International(p) limited (1998)
E-References	
1	https//chem.libretexts.org/Core/InorganicChemistry/DescriptiveChemistry/Periodic Trends of Elemental_Properties/Periodic_Properties_of_the_Elements
2	unicorn.ps.uci.edu/M3LC/lectures/LectureWeek1.pdf

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	**B.Sc**	Programme Code	**UCH**			Regulations	**2021-2022**	
Department	**Chemistry**		Semester				**1**	
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
21U1CHA01	**Allied Chemistry – I (BIOCHEMISTRY)**		5		0	5	25	75	100
Course Objectives	To impart knowledge in formation of molecule from atoms and various organic reaction mechanism, To prepare students for a carrier in chemical industries and To acquire basic knowledge in fundamental aspects of practical chemistry.							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.							
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.							
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.							
PO 4	Apply one's learning to real life situations.							
PO 5	Analyse and synthesise data from a variety of sources.							
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.							
PO 11	Ability to work independently, identify appropriate resources required for a project.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.							
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.							
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.							
PO 15	Ability to acquire knowledge and skills.							

COs	COURSE OUTCOME
CO 1	Students learn about bonding, anti-bonding, non-bonding and huckel rule of aromaticity..
CO 2	Students acquire knowledge about the fundamental concepts of acid and base and to determine the hardness of water.
CO 3	Students able to apply the knowledge to prepare various concentration of solution.
CO 4	Students understand about the various antibiotics and drugs.
CO 5	Students evaluate the characteristics of soil, fertilizers and pesticides.
Pre-requisites	Nil

KNOWLEDGE LEVELS			
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing			
CO / PO / KL Mapping **(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)**			
Cos	KLs	POs	KLs
CO 1	2	PO 1	3
		PO 2	4
		PO 3	6
CO 2	3	PO 4	1
		PO 5	3
		PO 6	2
CO 3	1	PO 7	4
		PO 8	5
		PO 9	3
CO 4	4	PO 10	1
		PO 11	4
		PO 12	2
CO 5	5	PO 13	6
		PO 14	2
		PO 15	4

CO / PO Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**Programme Outcome (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	1	1	2	2	3	1	1	2	2	1	3	1	3	1
CO2	3	2	1	1	3	2	2	1	3	1	2	2	1	2	2
CO3	1	1	1	3	1	2	1	1	1	3	1	2	1	2	1
CO4	2	3	1	1	2	1	1	2	2	1	3	1	1	1	3
CO5	1	2	2	1	1	1	2	3	1	1	2	1	2	1	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Chemical bonding and Aromaticity**	Periods	12
	Chemical Bonding – Definition, Types Ionic bond and covalent bond, hydrogen bond - formation and characteristics properties -bond order- magnetic properties. Structure of NaCl, CaF_2. MO theory-bonding in H_2, O_2, N_2 using MO theory -bonding -bond order - magnetic properties. Aromaticity -Huckels rule-types - Examples.		
Unit - II	**Acid and Base theory**	Periods	12
	Arrhenius concept – Lowry- Bronsted theory -Lewis acid and base theory - Conjugated Acid and base- Strength of an Acid and base. Principle and Classification of Hard Acid and Base -Soft Acid and base- HSAB. Acidity of water – Alkalinity-PH -hardness of water-types of hardness - methods RO and Zeolite process.		
Unit - III	**Volumetric analysis**	Periods	12
	Law of Volumetric analysis-Definitions of molarity, molality, normality and mole fraction. Titration-Back titration-Equivalence point-Indicator - Standard solution - Primary and secondary standards- Types of titrations– Acid-base and redox.		
Unit - IV	**Pharmaceutical Chemistry-I**	Periods	12
	Definition of the terms - Drug, Pharmacy, Pharmacophore, Pharmacodynamics and Pharmacopoeia. Antibiotics - Definition, classification - broad and narrow spectrum antibiotics - Penicillin, Chloramphenical and Erythromycin - structure and uses (structure elucidation not needed). Sulpha drugs -preparation of Sulphaguanine and Sulphathiazole. Mechanism and mode of action of sulpha drugs.		
Unit - V	**Agricultural Chemistry**	Periods	12
	Soil types-red soil, black soil, alluvial soil, desert soil, red soil; role of humus: Manures and their importance. Chemical fertilizers- Natural and synthetic fertilizers: Classification of NPK fertilizer - Preparation of Urea, Ammonium sulphate, Triple super phosphate potassium nitrate; role of macronutrients and micronutrients. Pesticides- classification-insecticides, herbicides and fungicides- Structure of important pesticides: DDT, BHC.		
Total Periods			60

Text Books	
1	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry (33rd edition), Vishal publishing co., (2017).
2	Jayashree Ghosh .S, Fundamental concepts of Applied Chemistry, New Delhi, S. Chand & Co., (2008).
3	Sharma B.K., Industrial chemistry including chemical engineering (16th), Meerut, Krishnaprakasam media., (2011).
4	Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (22nd edition), New Delhi, S. Chand & Co., (2016).
5	Dr.R.D.Madan, Modern inorganic chemistry,(3rd edition), New Delhi,S. Chand & Co., (2014).
6	Jayashree Ghosh, Text Book of Pharmaceutical Chemistry, S. Chand, New Delhi, 1999.
7	S.Lakshmi .Pharmaceutical Chemistry, S.Chand & Sons, New Delhi, 2004
8	V.K. Ahluwalia and Madhu Chopra, ―Medicinal Chemistry‖, Ane Books, New Delhi, 2008
References	
1	Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry , 47th edition, Vishal publishing co., 2017.
2	Ashutosh Kar, ―Medicinal Chemistry‖, Wiley Eastern Ltd., New Delhi, 1993
3	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry , 50th edition, New Delhi, S. Chand &Co., 2011.
4	David William and Thomas Lemke, Foyes Principles of Medicinal Chemistry, BI Publishers.
E-References	
1	www.sparknotes.com/chemistry/bonding/molecularorbital/section1.rhtm
2	www.organic-chemistry.org/namedreactions/nucleophilic-substitution-sn1-sn2.shtm
3	www.soest.hawaii.edu/oceanography/courses/OCN633/Fall%202013/Titrimetry.pdf
4	chem.libretexts.org/

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205**.**						
Programme	**B.Sc**	Programme Code	**UCH**		Regulations	**2018-2019**	
Department	**Chemistry**		Semester			**1**	
Course Code	Course Name	Periods per Week		Credit	Maximum Marks		
		L	P	C	CA	ESE	Total
20U1CHA01	**Allied Chemistry – I (Nutrition and dietics)**	5	0	5	25	75	100
COURSE OBJECTIVES	To impart knowledge in formation of molecule from atoms and various organic reaction mechanism, To prepare students for a carrier in chemical industries and To acquire basic knowledge in fundamental aspects of practical chemistry.						
POs	**PROGRAMME OUTCOME**						
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.						
PO 2	Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,						
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,						
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.						
PO 5	Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusions etc.,						
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,						
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group,and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.						
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.						
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.						
PO 10	Capability to use ICT in a variety of learning situations,demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.						

PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,

COs	**COURSE OUTCOME**
CO 1	Students learn about bonding, anti bonding, non bonding and Interhalogen compounds.
CO 2	Students acquire knowledge about the fundamental concepts of acid and base and to determine the hardness of water.
CO 3	Students able to apply the knowledge to prepare various concentration of solution.
CO 4	Students understand about the various antibiotics and drugs.
CO 5	Students evaluate the characteristics of soil, fertilizers and pesticides.
Pre-requisites	

Knowledge Levels			
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing			
CO / PO / KL Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)			
COs	**KLs**	**POs**	**KLs**
CO 1	5	PO 1	2
CO 2	2	PO 2	1
		PO 3	5
CO 3	3	PO 4	5
		PO 5	4
CO 4	4	PO 6	6
CO 5	2	PO 7	2
		PO 8	4
PSOs	**KLs**	PO 9	1
PSO 1	3	PO 10	3
		PO 11	3
PSO 2	4	PO 12	2
		PO 13	1
PSO 3	1	PO 14	6
		PO 15	3

CO / PO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	**PROGRAMME OUTCOME (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3
CO4	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO5	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2

CO / PSO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					
COs	Programme Specific Outcome (**POs**)				
	CO1	CO2	CO3	CO4	CO5
PSO1	1	2	3	2	2
PSO2	2	1	2	3	1
PSO3	1	2	1	1	2

Course Assessment Methods
Direct
1.Continuous Assessment Test I, II &Model 2. Assignment 3. End SemesterExaminations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Chemical bonding**	Periods	12
	Types of Bonding- Ionic Bond, covalent Bond and coordinate bond Molecular Orbital Theory-bonding, antibonding and nonbonding orbitals. M.O. diagrams of Hydrogen, Helium, Nitrogen, discussion of bond order and magnetic properties. Hydrides-classification and characteristics - preparation, properties and uses of Borazole, $NaBH_4$ and $LiAlH_4$.		
Unit - II	**Nuclear Chemistry**	Periods	12
	Natural radioactivity-radioactive series including Neptunium series-Group displacement law. Nuclear Binding energy, mass defect-Calculations. Nuclear Fission and Nuclear Fusion-differences – Stellar energy. Nuclear reactors, Applications of radioistopes-C-14 dating, rock dating.		

Unit - III	**Hybridisation, Electron displacement Effects & Stereoisomerism**	Periods	12
	Covalent Bond-Orbital Overlap-Hybridisation – Geometry of Organic molecules-Methane, Ethylene and Acetylene Electron displacement Effects: Inductive, Resonance, Hyper conjugative & steric effects. Their effect on the properties of compounds. Stereoisomerism: Symmetry-elements of symmetry- cause of optical activity, Tartaric acid. Racemisation. Resolution. Geometrical isomerism of Maleic and Fumaric acids.		
Unit - IV	**Aromatic compounds**	Periods	12
	Aromatic compounds-Aromaticity-Huckel's rule. Electrophilic substitution in Benzene-Mechanism of Nitration, Halogenation-Alkylation, Acylation. Isolation, preparation, properties and structure of Naphthalene Haworth's synthesis. Heterocyclic compounds:-Preparation, properties and uses of Furan, Thiophene, Pyrrole		
Unit - V	**Solutions & Chromatography**	Periods	12
	Solutions: Liquid in liquid type-Raoult's law for ideal solutions. positive and negative deviation from Raoult's law-Reasons and examples, Fractional distillation and Azeotropic distillation. Chromatography: principle and application of column, paper and thin layer chromatography.		
Total Periods			**60**

Text Books	
1	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry (33rd edition), Vishal publishing co., (2017).
2	Jayashree Ghosh .S, Fundamental concepts of Applied Chemistry, New Delhi, S. Chand & Co., (2008).
3	Sharma B.K., Industrial chemistry including chemical engineering (16th), Meerut, Krishnaprakasam media., (2011).
4	Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (22nd edition), New Delhi, S. Chand & Co., (2016).
5	Dr.R.D.Madan, Modern inorganic chemistry,(3rd edition), New Delhi,S. Chand & Co., (2014).
References	
1	Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry , 47th edition, Vishal publishing co., 2017.
2	Jayashree Ghosh, Text Book of Pharmaceutical Chemistry, S. Chand, New Delhi,1999.
3	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry , 50th edition, New Delhi, S. Chand &Co., 2011.
E-References	
1	www.sparknotes.com/chemistry/bonding/molecularorbital/section1.rhtm

2	www.khanacademy.org/science/ap-chemistry
3	www.soest.hawaii.edu/oceanography/courses/OCN633/Fall%202013/Titrimetry.pdf
4	www.nhs.uk
5	chem.libretexts.org/

Signature of BOS Chairman

QP CODE-21U1CHC01

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES COLLEGE FOR WOMEN
(Autonomous)

DEPARTMENT OF CHEMISTRY

B.Sc. DEGREE EXAMINATION

MODEL QUESTION- GENERAL CHEMISTRY – I

Time: 3 Hrs. Max. Marks : 75

Section A

Answer all questions (20 x 1 = 20)

1	Which of the following has half-filled stability				K3	CO-1
	A	Fe	B	Cr		
	C	Mn	D	Zn		
2	Which of the following has the electronic configuration of $1s^2\ 2s^2\ 2p^6\ 3d^5\ 4s^1$				K1	CO-1
	A	Mn	B	Fe		
	C	Co	D	Cr		
3	Which has the highest Ionisation potential				K1	CO-1
	A	Na	B	Mg		
	C	Si	D	P		
4	For n=1, Write the values of l, m and s.				K3	CO-1
	A	1,0,±1/2		1,0,±1/2		
	C	0,1,±1/2		0,1,±1/2		
5	What are the factors affecting the formation of ionic bond.				K1	CO-2
	A	low ionization energy	B	high electron affinity		
	C	high lattice energy of ionic bond	D	all the above		
6	Which one of the following is covalent molecule?				K1	CO-2
	A	HF	B	H_2		
	C	NaOH	D	NaCl		
7	Name the molecule which has partial ionic character.				K1	CO-2
	A	H_2	B	F_2		
	C	HF	D	None of the above		
8	Identify the combination which greatly distorts regular geometry.				K1	CO-2
	A	lp-lp repulsion	B	lp-bp repulsion		
	C	bp-bp repulsion	D	none of these		
9	Write the general molecular formula of alkanes				K1	CO-3
	A	C_nH_{2n+2}	B	C_nH_{2n}		
	C	C_nH_{2n-2}	D	C_nH_{2n-1}		
10	Catalytic hydrogenation of ---------- producing alkanes.				K1	CO-3
	A	alkanes	B	alkadienes		

	C	alkenes	D	polyenes		
11	What is the first step of free radical substitution reaction				K1	CO-3
	A	Propagation	B	Initiation		
	C	Termination	D	Copling		
12	Order of reactivity for the addition of hydrogen halides in alkenes				K1	CO-3
	A	HCl > HBr > HI	B	HI > HBr > HCl		
	C	HBr > HI > HCl	D	HI > HCl> HBr		
13	If the mean free path of a gas at 760 torr is λ. What will be its value at 5 atm pressure.				K3	CO-4
	A	λ/5	B	5λ		
	C	5λ /760	D	λ^2		
14	The diameter of molecule B is half that of molecule A. The ratio of mean free path (λA/λB) will be				K3	CO-4
	A	½	B	¼		
	C	4	D	2		
15	Which Of the following has high viscosity				K1	CO-4
	A	Water	B	Benzene		
	C	Acetic acid	D	Chloroform		
16	Effect of Temperature On Vapour Pressure				K1	CO-4
	A	Increase	B	Decrease		
	C	No change	D	Increase and then decrease		
17	Write the significant figure of 0.00027				K3	CO-5
	A	$2.74x10^{-5}$	B	$2.74x10^{-4}$		
	C	$2.74x\ 10^{-2}$	D	$2.74\ x10^{-3}$		
18	Normal solutions can be prepared with				K1	CO-5
	A	molecular weight in grams	B	molecular weight in litre		
	C	equivalent weight in grams	D	atomic weight in grams		
19	Give an example for acid-base titration				K1	CO-5
	A	HCl vs NaCl	B	NH_4OH vs NaOH		
	C	HCl vs NaOH	D	NH_3 vs HCl		
20	What is the colour of phenolphthalein in basic medium.				K1	CO-5
	A	Orange	B	Yellow		
	C	Pink	D	colourless		
	Section B					
	Answer All questions (5 x 5 = 25)					
21	A	Explain the extra stability of half-filled and completely filled orbitals.			K2	CO-1
		OR				
	B	Discuss the factors affecting Ionisation Energy.			K1	CO-1
22	A	Draw MO diagram for F_2 molecule			K2	CO-2
		OR				
	B	Explain Fajan's rule and its applications.			K1	CO-2
23	A	Explain sp^3 & sp hybridisation with examples			K2	CO-3
		OR				

	B	Explain covalent bond properties of organic molecules.	K2	CO-3
24	A	Explain Davisson Germer experiment	K4	CO-4
		OR		
	B	Define surface energy. Explain the surface active reagents.	K1	CO-4
25	A	Explain the types of errors	K1	CO-5
		OR		
	B	Write short note on complexometric titrations.	K2	CO-5
		Section C **Answer ANY THREE Questions (3 x 10 = 30)**		
26		Discuss Quantum numbers and their significance	K1	CO-1
27		Explain VSEPR theory and shapes of simple covalent molecules.	K4	CO-2
28		Explain in detail about inductive effect with examples.	K2	CO-3
29		Derive Vander waals equation for real gases.	K5	CO-4
30		Explain different type of titrations	K1	CO-5

TABLE OF SPECIFICATIONS (Question wise – No. of questions)

Outcome/ Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	4	1	2	-	-	-	7
II	5	1	-	1	-	-	7
III	4	3	-	-	-	-	7
IV	3	-	2	1	1	-	7
V	5	1	1	-	-	-	7
Total	21	6	5	2	1	-	35

TABLE OF SPECIFICATIONS (Marks wise – Total marks)

Outcome/ Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	17	5	2	-	-	-	24
II	9	5	-	10	-	-	24
III	4	20	-	-	-	-	24
IV	7	-	2	5	10	-	24
V	18	5	1	-	-	-	24
Total	55	35	5	15	10	-	120

QP CODE-21U1CHA01

VIVEKANANDHACOLLEGEOF ARTSANDSCIENCESCOLLEGEFORWOMEN

(Autonomous)

DEPARTMENTOFCHEMISTRY

B.Sc. DEGREE EXAMINATION - I

SEMESTER MODEL QUESTION

ALLIED CHEMISTRY – I

(BIOCHEMISTRY)

Time:3 Hrs. Max.Marks:75

Section -A

Answer all questions (20x1=20)

1	Which of the following is an example for ionic bond.?				K1	CO-1
	A	NaCl	B	Cl_2		
	C	F_2	D	KCl		
2	NaCl crystal has a.....structure.				K1	CO-1
	A	Tetrahedral	B	Trigonal		
	C	Octahedral	D	hexagonal		
3	Covalent bond involves_____of electrons				K1	CO-1
	A	Sharing	B	Transfering		
	C	Both	D	None		
4	What is the bond order for O_2 molecule?				K3	CO-1
	A	1	B	2		
	C	0	D	3		
5	In the Bronsted-Lowry theory, a base is defined as				K2	CO-2
	A	a proton donor	B	a hydroxide donor		
	C	an electron pair acceptor	D	a proton acceptor		
6	pH of an alkaline water will be.....				K2	CO-2
	A	Zero	B	Low		
	C	High	D	None		
7	Hardness in water is caused due to the presence of				K3	CO-2
	A	undissolved salts of Ca, Mg	B	dissolved salts of K		
	C	dissolved salts of Ca, Mg	D	Undissolved $CaCO_3$		
8	Reverse Osmosis membranes are made of_____				K2	CO-2
	A	plastic	B	cotton		

	C	silk	D	polymer		
9	Give an example for primary standard solution				K2	CO-3
	A	Oxalic acid	B	NaOH		
	C	KMnO4	D	Na2S2O3		
10	Oxalic acid Vs NaOH is an example for_____titration				K2	CO-3
	A	Acid base	B	Redox		
	C	Conductometric	D	Complexometric		
11	Number of Gram Equivalence per litre of solution is termed as------				K2	CO-3
	A	Mole fraction	B	Molality		
	C	Normality	D	Molarity		
	The solution whose strength is known as_____solution				K4	CO-3
12	A	Primary	B	Secondary		
	C	Both	D	none		
13	The structural unit which is responsible for activity of drug is termed as------				K1	CO-4
	A	Pharmacopore	B	Pharmacokinetics		
	C	Pharmacology	D	Pharma		
14	_____Is used to kill microorganism				K1	CO-4
	A	Antibiotics	B	antipyrectic		
	C	analgesics	D	none		
15	Sulpha drugs contains ---------- group				K2	CO-4
	A	Sulphonyl	B	amine		
	C	Acid	D	aldehyde		
16	The first isolated antibiotic is called ----------.				K2	CO-4
	A	Penicillin	B	chlorophenicol		
	C	Tetraxylene	D	sulphathiazole		
17	Give an example for nitrogenous fertilizer..				K2	CO-5
	A	Urea	B	KCN		
	C	K_2SO_4	D	none		
18	_____Is a substance that is toxic to plants used to destroy unwanted vegetation.				K1	CO-5
	A	Herbicides	B	Fungicides		
	C	Rodenticide	D	all		
19	Soil contain adequate amount of potash, lime and phosphoric acid.				K2	CO-5

	A	Alluvial soil	B	Black soil		
	C	red soil	D	all		
20	DDTstandsfor----------				K3	CO-5
	A	Dichloro diphenyl trichloroethane	B	Dichloro diphenyl trichloromethane		
	C	Dichloro diphenylethane	D	Dichloromethyl trichloroethane		
	SectionB **AnswerAllquestions (5x5= 25)**					
21	A	Explain the characteristics of ionic bond			K4	CO-1
		OR				
	B	Draw the structure of NaCl and explain its nature of bonding.			K3	CO-1
22	A	Explain Arrhenius concept of acid and bases.			K2	CO-2
		OR				
	B	Write short note on conjugate acids and bases.			K4	CO-2
23	A	Define the following terms i) Molarity ii)Normality			K1	CO-3
		OR				
	B	Define primary and secondary standard substances with suitable examples.			K4	CO-3
24	A	Write the preparation for sulphaguanine and sulphathiazole			K3	CO-4
		OR				
	B	Give a brief account on antibiotics.			K2	CO-4
25	A	Describe the different types of soils			K1	CO-5
		OR				
	B	Explain the classification of nitrogeneous fertilizer with examples.			K1	CO-5
	SectionC **AnswerANYTHREE Questions (3x10= 30)**					
26		Explain the formation of covalent bond with two examples			K3	CO-1
27		Explain the classification of acid and bases with examples.			K1	CO-2
28		Give an account on Acid–base and redox titration.			K3	CO-3
29		Explain the mechanism and mode of action of sulpha drugs?			K1	CO-4
30		Explain the classification and preparation and properties of Organochlorine and Organophosphate pesticides.			K2	CO-5

TABLE OF SPECIFICATIONS (Question wise–No.ofquestions)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	3	0	3	1	0	0	7
II	1	4	1	1	0	0	7
III	1	3	1	2	0	0	7
IV	3	3	1	0	0	0	7
V	3	3	1	0	0	0	7
Total	20	10	2	2	1	0	35

TABLE OF SPECIFICATIONS (Markswise–Totalmarks)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	3	0	16	5	0	0	24
II	10	8	1	5	0	0	24
III	5	3	10	6	0	0	24
IV	12	7	5	0	0	0	24
V	11	12	1	0	0	0	24
Total	41	30	33	16	0	0	120

QP CODE- 20U1CHA01

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES COLLEGE FOR WOMEN

(Autonomous)

DEPARTMENT OF CHEMISTRY

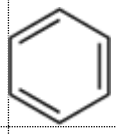
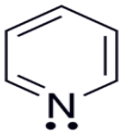
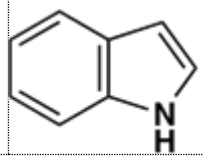
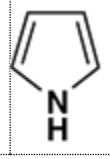
MODEL QUESTION- ALLIED CHEMISTRY-I

Time: 3 Hrs. **Max.Marks : 75**

Section -A

Answer all questions (20x1=20)

1	The attraction of two ions due to opposite charge is known as				K2	CO-1
	A	ionic bonding	B	covalent bonding		
	C	metallic bonding	D	dative bonding		
2	Ionic bonds are				K2	CO-1
	A	easy to break	B	weak		
	C	electrical bonds	D	very difficult to break		
3	The bond order of NO molecule is				K2	CO-1
	A	1	B	2		
	C	2.5	D	3		
4	Which of the following compounds of boron does not exist in the free form				K1	CO-1
	A	BCl3	B	BF3		
	C	BBr3	D	BH3		
5	Emission of which one of the following leaves both atomic number and mass number unchanged?				K1	CO-2
	A	positron	B	neutron		
	C	alpha particle	D	gamma radiation		
6	A Geiger-Muller tube is a				K4	CO-2
	A	Free radical	B	cationic		
	C	anionic	D	condensation		
7	Which of the following describes what occurs in the fission process?				K1	CO-2
	A	A heavy nucleus is fragmented into lighter ones.	B	A neutron is split into a neutron and proton.		
	C	Two light nuclei are combined into a heavier one.	D	A proton is split into three quarks.		
8	Which type of radiation is the **least** penetrating?				K1	CO-2
	A	alpha	B	beta		

	C	gamma	D	x-ray			
9	In allene (C3H4), the type(s) of hybridisation of the carbon atoms is (are)					K1	CO-3
	A	sp and sp3	B	sp and sp2			
	C	Only sp2	D	sp^2 and sp3			
10	Which one of the following is paramagnetic?					K1	CO-3
	A	N_2	B	NO			
	C	CO	D	O_3			
11	Among the following the maximum covalent character is shown by the compound					K2	CO-3
	A	$MgCl_2$	B	$FeCl_2$			
	C	$SnCl_2$	D	$AlCl_3$			
12	The maximum number of hydrogen bonds that a molecule of water can have is					K4	CO-3
	A	1	B	3			
	C	2	D	4			
13	Identify the correct statement which is related to aromatic hydrocarbon?					K3	CO-4
	A	It has only sigma bonds	B	It has only pi bonds			
	C	It has a sigma and two pi bonds	D	It has a sigma and delocalized pi bond			
14	Which of the following statements regarding electrophilic aromatic substitution is wrong?					K1	CO-4
	A	Acetyl and cyano substituents are both deactivating and m- directing.	B	Alkyl groups are activating and o,p-directing.			
	C	Ammonio groups are m-directing but amino groups are and o,p-directing.	D	Chloro and methoxy substituents are both deactivating and o,p- directing.			
15	Which is most reactive towards an electrophile?					K1	CO-4
	A		B				
	C		D				
16	Which of the following solvents is a heterocyclic compound?					K1	CO-4
	A	DMSO.	B	THF			

	C	DMF.	D	Diglyme		
17	People add sodium chloride to water while boiling eggs. This is to				K4	CO-5
	A	Decrease the boiling point.	B	Increase the boiling point.		
	C	Prevent the breaking of eggs.	D	Make eggs tasty.		
18	The boiling point of an azeotropic mixture of water and ethanol is less than that of water and ethanol. The mixture shows				K4	CO-5
	A	No deviation from Raoult's Law.	B	Positive deviation from Raoult's Law.		
	C	Negative deviation from Raoult's Law.	D	That the solution is unsaturated.		
19	In which Chromatography s.p. is more polar than m.p.?				K1	CO-5
	A	Ion exchange	B	Liquid liquid Chromatography		
	C	Reversed chromatography	D	None of the above		
20	What is Eluent ?				K1	CO-5
	A	Is a liquid solution.	B	Is a liquid solution that is a result from Elution		
	C	It is a solvent that used for separation of absorbed material from stationary phase.	D	None of the above		
	Section B **Answer All questions (5 x 5 = 25)**					
21	A	Explain the diamagnetism of nitrogen molecule on the basis of M.O.theory.			K2	CO-1
		OR				
	B	What are hydrides? How are they classified? Give one example.			K1	CO-1
22	A	Define and explain Nuclear fission and Nuclear fusion.			K2	CO-2
		OR				
	B	Explain mass defect?			K2	CO-2
23	A	Explain Resonance and steric effect?			K1	CO-3
		OR				
	B	Explain Elements of symmetry?			K2	CO-3
24	A	What is aromaticity?explain with examples.			K2	CO-4
		OR				
	B	Explain Haworth synthesis of Napthalein?			K2	CO-4
25	A	Describe separation of liquids by fractional distillation.			K3	CO-5
		OR				
	B	Explain column chromatography?			K1	CO-5

		Section C **Answer ANY THREE Questions (3 x 10 = 30)**		
26		What do you understand by the terms bonding and non- bonding molecular orbitals? Why are they so called? Illustrate with one example and Discuss in detail any two methods of preparation of Borazole and indicate three of its chemical properties	K1	CO-1
27		What is natural radioactivity? Explain with examples? and Discuss application of radioisotope?	K2	CO-2
28		Discuss the geomentrical isomerism in Maleic acid and fumaric acid. and Explain resolution methods.	K1	CO-3
29		Write mechanism of acylation in benzene and How is pyrrole prepared? Explain five of its chemical properties	K1	CO-4
30		Give the principle, method and applications of paper chromatography.	K2	CO-5

TABLE OF SPECIFICATIONS (Question wise – No. of questions)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	3	4	0	0	0	0	7
II	3	3	0	1	0	0	7
III	4	2	0	1	0	0	7
IV	4	2	1	1	0	0	7
V	3	1	0	2	1	0	7
Total	17	12	1	5	1	0	35

TABLE OF SPECIFICATIONS (Marks wise – Total marks)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	6	18	0	0	0	0	24
II	3	20	0	1	0	0	24
III	17	6	0	1	0	0	24
IV	12	10	0	2	0	0	24
V	7	10	5	2	0	0	24
Total	45	64	05	06	0	0	120

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	**B.Sc**	Programme Code	**UCH**			Regulations	**2021-2022**	
Department	**Chemistry**		Semester				**2**	
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
21U2CHC02	**Core paper - II: General Chemistry – II**		5		0	5	25	75	100
Course Objectives	1. To gain knowledge about inorganic elements and metallurgy. 2. Acquire the knowledge about hydrocarbons. 3. To study about Reagents and chemical equilibrium.							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.							
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.							
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.							
PO 4	Apply one's learning to real life situations.							
PO 5	Analyse and synthesise data from a variety of sources.							
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.							
PO 11	Ability to work independently, identify appropriate resources required for a project.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.							
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.							
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.							
PO 15	Ability to acquire knowledge and skills.							

COs	COURSE OUTCOME
CO 1	Students can identify s and zero block elements; methods of extraction, separation and purification of metals from its corresponding ore.
CO 2	Students can identify periodic elements in p block, such as borane chemistry and inter-halogen chemistry
CO 3	Students identify the methods of preparation and properties of alicyclic and acyclic hydrocarbons
CO 4	Students assess and classify organic reagents
CO 5	Students identify the various thermodynamic parameters and phase rule
Pre-requisites	Nil

KNOWLEDGE LEVELS

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

Cos	KLs	POs	KLs
CO 1	1	PO 1	2
		PO 2	3
		PO 3	5
CO 2	3	PO 4	1
		PO 5	4
		PO 6	3
CO 3	2	PO 7	6
		PO 8	3
		PO 9	1
CO 4	4	PO 10	2
		PO 11	4
		PO 12	4
CO 5	5	PO 13	2
		PO 14	2
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**Programme Outcome (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	1	1	3	1	1	1	1	3	2	1	1	2	2	1
CO2	2	3	1	1	2	3	1	3	1	2	2	2	2	2	1
CO3	3	2	1	2	1	2	1	2	2	3	1	1	3	3	1
CO4	1	2	2	1	3	2	1	2	1	1	3	3	1	1	2
CO5	1	1	3	1	2	1	2	1	1	1	2	2	1	1	3

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Chemistry of s-block, zero group elements and metallurgy**	Periods	12
	General characteristics of s-block elements – comparative study of elements – alkali metals and their hydroxides, oxides and halides, alkaline earth metals and their oxides, carbonates and sulphates. Diagonal relationship of Li & Mg, Be & Al, chemistry of NaOH, KI & $Mg(NH_4)PO_4$. Zero group elements – position in the periodic table, occurrence, isolation, applications, compounds of Xe – XeF6 & XeOF4. Metallurgy : Occurrence of metals – concentration of ores – froth floatation, magnetic separation, calcination, roasting, smelting, flux, alumino-thermic process, purification of metals – electrolysis, zone refining, van Arkel de-Boer process.		
Unit - II	**p-block elements –I and II**	Periods	12
	Synthesis and structure of diborane and higher boranes (B_4H_{10} and B_5H_9), boron-nitrogen compounds ($B_3N_3H_6$ and BN). Preparation and applications of silanes and silicones. Preparation and reactions of hydrazine, hydroxylamine. Classifications of oxides based on (i) Chemical behaviour and (ii) Oxygen content. Inter halogen compounds and pseudo halogens.		
Unit - III	**Alkenes, alkynes and cycloalkanes**	Periods	12
	Alkenes- orbital model of double bond, chemical reactions of alkenes- mechanism of Electrophilic and free radical additions- Markovnikoff s rule, peroxide effect, hydroboration, ozonolysis and allylic substitution by NBS. Diels-alder reaction. Elimination reactions-mechanisms of E_1 and E_2Reactions -Hofmann and saytzeff rule.Dienes - Types of dienes, reactions of conjugated dienes - 1,2 and 1,4 addition of HBr to 1,3 – butadiene and Diel's - Alder reaction. Alkynes - Preparation by dehydrohalogenation of dihalides, dehalogenation of tetrahalides, Properties; Acidity of acetylenic hydrogen (formation of Metal acetylides). Preparation of higher acetylenes, Metal ammonia reductions, Physical properties. Chemical reactivity - electrophilic addition of X_2, HX, H_2O (Tautomerism), Oxidation with $KMnO_4$, OsO4, reduction and Polymerization reaction of acetylene. Nomenclature, Preparation by Freunds method, Wislicenus method.Properties - reactivity of cyclopropane and cyclobutane by comparing with alkanes, Stability of cycloalkanes - Baeyer's strain theory, Sachse and Mohr predictions and Pitzer's strain theory. Conformational structures of cyclobutane, cyclopentane, cyclohexane.		
Unit - IV	**Organic Reagents**	Periods	12

	Reagents in Organic Synthesis: Synthesis and applications of BF_3, NBS, Diazomethane, Lead tetra-acetate, Osmium tetraoxide, Woodward Prevorst hydroxylation reagent, $LiAlH_4$, Grignard reagent, organozinc and organolithium reagent.		
Unit - V	**Chemical equilibrium and Phase equilibrium**	Periods	12
	Criteria of thermodynamic equilibrium, degree of advancement of reaction, chemical equilibria in ideal gases, concept of fugacity. Thermodynamic derivation of relation between Gibbs free energy of reaction and reaction quotient. Coupling of exoergic and endoergic reactions. Equilibrium constants and their quantitative dependence on temperature, pressure and concentration. Free energy of mixing and spontaneity; thermodynamic derivation of relations between the various equilibrium constants Kp, Kc and Kx. Le- Chatelier principle (quantitative treatment); equilibrium between ideal gases and a pure condensed phase. Phase Equilibrium : Phase rule and its applications to one component and simple two component systems, Nernst distribution law-Association and Dissociation phenomena.		
Total Periods			60

Text Books	
1	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry 33rd edition, Vishal publishing co.,2017.
2	Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry, 47th edition, Vishal publishing co., 2017.
3	Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, 22nd edition, New Delhi, S. Chand & Co., 2016.
4	Physical metallurgy : principles and practice / V. Raghavan (Formerly Professor, Indian Institute of Technology Delhi)
5	A textbook of qualitative inorganic analysis by A.I. Vogel
References	
1	Morrison R.T. and Boyd R.N., Organic Chemistry 7th Edition, Pearson Education, India 2010.
2	Madan. R. D., Inorganic Chemistry 3rd edition, New Delhi, S. Chand and Co., 2012.
3	Mukherji. S. M, Singh. S. P, Kapoor. R.P, Organic Chemistry 4th edition New age International pvt. limited 1998.
4	Cotton and Wilkinson's Basic Inorganic Chemistry
5	Jerry March's Advanced Organic Chemistry-Reactions, Mechanism and Structure
E-References	
1	https://www.khanacademy.org/science/biology/chemistry--of-life/chemical-bonds-and-reactions/v/ionic- covalent-and-metallic-bonds
2	https://www.cliffsnotes.com/study-guides/chemistry/organic-chemistry-i/structure-and-properties-of-alkanes/alkanes-physical-properties

3	https://chem.libretexts.org/
4	http://www.chem.tamu.edu/class/fyp/mcquest/mcquest.html
5	http://nptel.ac.in/courses/104103069/15

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	**B.Sc**	Programme Code	**UCH**			Regulations	**2021-2022**	
Department	**Chemistry**		Semester				**2**	
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
21U2CHA02	**Allied Chemistry– II (Biochemistry)**		5			5	25	75	100
Course Objectives	To compile students with various chromatography techniques and its applications towards industries and research laboratories. To educate about the chemistry of bio-organic and bio-inorganic compounds and various kinds of drugs and its uses.							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.							
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.							
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.							
PO 4	Apply one's learning to real life situations.							
PO 5	Analyse and synthesise data from a variety of sources.							
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.							
PO 11	Ability to work independently, identify appropriate resources required for a project.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.							
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.							
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.							
PO 15	Ability to acquire knowledge and skills.							

COs	COURSE OUTCOME
CO 1	Students predict the concept of various chromatographic techniques.
CO 2	Students are able to understand the biological importance of carbohydrate.
CO 3	Students identify the details of bioorganic compounds and bioinorganic compounds.
CO 4	Students utilize knowledge of antipyretics, analgesic,antiseptics,disinfectants and anesthetics Students can evaluate the different pharmaceutically important compounds and their uses in reallife
CO 5	Students acquired practical knowledge in elemental analysis and functional group identification.
Pre-requisites	Nil

KNOWLEDGE LEVELS

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

Cos	KLs	POs	KLs
CO 1	1	PO 1	1
		PO 2	3
		PO 3	2
CO 2	2	PO 4	4
		PO 5	6
		PO 6	2
CO 3	2	PO 7	4
		PO 8	3
		PO 9	4
CO 4	3	PO 10	5
		PO 11	3
		PO 12	2
CO 5	4	PO 13	1
		PO 14	4
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**Programme Outcome (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	1	2	1	1	2	1	1	1	1	1	2	3	1	1
CO2	2	2	3	1	1	3	1	2	1	1	2	3	2	1	1
CO3	2	2	3	1	1	3	1	2	1	1	2	3	2	1	1
CO4	1	3	2	2	1	2	2	3	2	1	3	2	1	2	1
CO5	1	2	1	3	1	1	1	2	3	2	2	1	1	3	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Chromatography**	Periods	12
	Chromatography-definition, types-column, paper, thinlayer, -method of separation application-Similarities and difference between GC/MS and ion chromatography. High pressure liquid chromatography –HPLC – principle-experimental techniques-instrumentation and advantages.		
Unit - II	**Aminoacids and Carbohydrates**	Periods	12
	Aminoacids – Preparation- Gabriel method, Strecker synthesis- Isoelectric point, Reactions of glycine. Polypeptide –Proteins-Structure, properties and Classification. Carbohydrates-definition,Classification,Preparation and Reactions of glucose and fructose- Interconversion of glucose to fructose and vice-versa-sucrose, starch and cellulose.		
Unit - III	**Bio-inorganic Chemistry**	Periods	12
	Structure of chlorophyll, phorphyrin unit and photosynthesis. Nitrogen fixation, carbon cycle. structure of haem proteins: haemoglobin, myoglobin. Oxygen transport and respiration. Metallo enzymes, Role of alkali and alkaline earth metal ions in biological system.		
Unit - IV	**Pharmaceutical Chemistry-II**	Periods	12
	Structure and mode of action: Analgesics and Antipyretics-salicylic acid derivatives-aspirin, p-aminophenolderivatives- para acetamol and ibuprofen. Antiseptic and disinfectants-definition and distinction, crystal violet, acridine. Anaesthetics-definition, classification- local and general. Preparation, properties and uses of cocaine and benzococaine.		
Unit - V	**OrganicAnalysis**	Periods	12
	Qualitative analysis of organic substances: test for saturation and unsaturation; aliphatic & aromatic; acidicand basic nature of organic compound; elements test for N, S and halogens: functional groups like acid,phenol,aldehyde,ketone, carbohydrate,amine, ester, amide, anilidesanddiamide.		
Total Periods			60

Text Books	
1	Puri B.R.,SharmaL.R.,KaliaK.K., Principles of Inorganic Chemistry,50th edition, New Delhi, S.Chand&Co.,(2011).
2	Puri B.R.,Sharma L.R.,Pathania M.S.,Principles of Physical Chemistry 23rd edition. New Delhi,S.Chand&Co.,2004.
3	V. Venkateswaran, R.Veeraswamy andA.R.Kulandaivelu, Basic Principles of Practical Chemistry, New Delhi,S.Chand&Co, 1995.
4	Bahl B.S.and Arun Bahl, Advanced Organic Chemistry, 22nd edition, New Delhi, S.Chand&Co.,2016.
5	Pandey.O.P, Bajpai.D.N.,Giri.S.,Practical Chemistry,NewDelhi,S.Chand&Co,2012.
6	P.Parimoo, ― A Text Book of Medicinal Chemistry‖, CBS publishers, New Delhi, 2006
7	S.Lakshmi Pharmaceutical Chemistry, S.Chand & Sons, New Delhi, 2004
8	V.K. Ahluwalia and Madhu Chopra, ―Medicinal Chemistry‖, Ane Books, New Delhi, 2008
References	
1	Jayashree Ghosh .S,Fundamental concepts of Applied Chemistry, NewDelhi,S.Chand &Co.,2008.
2	Sharma. B.K., Industrial chemistry including chemical engineering -16th- Meerut, Krishna prakasam media. 2011.
3	David William and Thomas Lemke, Foyes Principles of Medicinal Chemistry, BI Publishers.
4	Ashutosh Kar, ―Medicinal Chemistry‖, Wiley Eastern Ltd., New Delhi, 1993
E-References	
1	https://www.khanacademy.org/test-prep/mcat/chemical-processes/separations- purifications/a/principles-of-chromatography
2	https://en.wikipedia.org/wiki/Carbohydrate.
3	https://chem.libretexts.org/

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.						
Programme	**B.Sc**	Programme Code	**UCH**		Regulations	**2020-2021**	
Department	**Chemistry**		Semester			**2**	
Course Code	Course Name	Periods per Week			Credit	Maximum Marks	
		L		P	C	CA	ESE	Total
20U2CHA02	**Allied Chemistry – II (Nutrition & dietetics)**	5		0	5	25	75	100
COURSE OBJECTIVES	To compile students with various chromatography techniques and its applications towards industries and research laboratories. To educate about the chemistry of bio-organic and bio-inorganic compounds and various kinds of drugs and its uses.							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.							
PO 2	Ability to express thoughts and ideas effectively in writingand orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,							
PO 3	Capability to apply analytic thought to a body of knowledge;analyse and evaluate evidence,arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,							
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.							
PO 5	Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusions etc.,							
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group,and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.							
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,							

PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,

COs	**COURSE OUTCOME**
CO 1	Students predict the concept of various chromatographic techniques.
CO 2	Students identify the details of bio organic compounds and bio inorganic compounds.
CO 3	Students utilize knowledge of antipyretics, analgesic, antiseptics, disinfectants and anesthetics
CO 4	Students analyze the structure of different haem proteins.
CO 5	Students evaluate the different pharmaceutically important compounds and their uses in real life.
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**KLs**	**POs**	**KLs**
CO 1	4	PO 1	2
		PO 2	1
CO 2	2		
		PO 3	5
CO 3	3	PO 4	5
		PO 5	4
CO 4	4	PO 6	6
		PO 7	2
CO 5	5		
		PO 8	4
PSOs	**KLs**	PO 9	1
		PO 10	3
PSO 1	3		
		PO 11	3
		PO 12	2
PSO 2	4		
		PO 13	1
PSO 3	1	PO 14	6
		PO 15	3

CO / PO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	**PROGRAMME OUTCOME (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3
CO4	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO5	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1

CO / PSO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					
COs	**Programme Specific Outcome (POs)**				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	2	3	2	1
PSO2	3	1	2	3	2
PSO3	1	2	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II &Model 2. Assignment 3. End SemesterExaminations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Co-ordination chemistry**	Periods	12
	Co-ordination chemistry-definition of terms- classification of ligands-NomenclatureChelation-Examples. Chelate effect- explanation. Werner‘s theory-conductivity and precipitation studies. Sidgwick‘s theory- Effective Atomic Number concept. Pauling‘s theory-postulates-Application to octahedral, square planar and tetrahedral complexes. Pauling‘s theory and magnetic properties of complexes. Merits and demerits of Pauling‘s theory. Biological role of Haemoglobin and Chlorophyll (Elementary idea of structure and functions).		
Unit - II	**Carbohydrates & Aminoacids**	Periods	12
	Carbohydrates: Classification, preparation and properties of Glucose and Fructose- Properties of Starch, Cellulose and derivatives of Cellulose. Inter conversion of Glucose to Fructose and vice versa. Amino Acids-classification, preparation and properties of Glycine and Alanine.		

Unit - III	**Pharmaceutical chemistry**	Periods	12
	Chemotherapy: Preparation, uses and mode of action of sulpha drugs-prontosil, sulphadiazine and sulphafurazole. Uses of penicillin, chloramphenicol and streptomycin, Definition and one example each for-analgesics, antipyretics, tranquilizers, sedatives, hypnotics, local anaesthetics and general anaesthetics. Cause and treatment of diabetes, cancer andAIDS.		
Unit - IV	**Photochemistry**	Periods	12
	Grotthus-Draper law and Stark-Einstien's law of photochemical equivalence. Quantum yield. Example for photochemical reactions- Hydrogen-Chlorine reaction (elementary idea only) Photosynthesis. Phosphorescence and Fluorescence. Phase Rule: Phase rule and the definition of terms in it. Application of phase rule to water system. Reduced phase rule and its application to a simple eutetic system (Pb-Ag) Freezing mixtures.		
Unit - V	**Electro Chemistry**	Periods	12
	Kohlrausch law -measurement of conductance, pH determination. Conductometic titrations. Galvanic cells-EMF-standard electrode potentials, reference electrodes. Corrosion: Methods of prevention.		
	Total Periods		**60**

Text Books	
1	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry,50th edition, New Delhi, S. Chand & Co., (2011). R., Sharma L.R., Kalia K.K., Principles of
2	Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry 23rdedition. New Delhi, S. Chand &Co., 2004. Applied Chemistry, New Delhi, S. Chand & Co., 2008.
3	V. Venkateswaran, R. Veeraswamy and A.R.Kulandaivelu, Basic Principles of Practical Chemistry, New Delhi, S.Chand & Co, 1995.
4	Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, 22nd edition, New Delhi, S. Chand & Co., 2016.
5	Pandey.O.P, Bajpai.D.N., Giri.S., Practical Chemistry, New Delhi, S.Chand & Co, 2012.
References	
1	Jayashree Ghosh .S, Fundamental concepts of Applied Chemistry, New Delhi, S. Chand & Co., 2008.
2	Sharma.B.K., Industrial chemistry including chemical engineering -16th- Meerut, Krishnaprakasam media. 2011.
E-References	
1	ps://www.khanacademy.org/test-prep/mcat/chemical-processes/separations-purifications/a/principles-chromatography
2	https://en.wikipedia.org/wiki/Carbohydrate.
3	https://chem.libretexts.org/

Signature of BOS Chair*man*

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	**B.Sc**	Programme Code	**UCH**			Regulations	**2021-2022**	
Department	**Chemistry**		Semester				**2**	
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
21U2CHCP01	**Core Practical–I-Volumetric Estimations & Inorganic Preparations**				3	05	25	75	100
Course Objectives	To understand the principles of volumetric analysis. To know about different types of volumetric titrations. To enable the students to have hands-on training on preparation of simple							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.							
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.							
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.							
PO 4	Apply one's learning to real life situations.							
PO 5	Analyse and synthesise data from a variety of sources.							
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.							
PO 11	Ability to work independently, identify appropriate resources required for a project.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.							
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.							
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.							
PO 15	Ability to acquire knowledge and skills.							

COs	COURSE OUTCOME
CO 1	Students will learn how to make solutions and do the titrations with different kinds
CO 2	Students will understand reactions taking place during the experiment
CO 3	The students will be able to apply the knowledge about nature, significance, and influence of errors and to be avoided or minimized during quantitative examination of experiment
CO 4	Students will analyze the given samples volumetrically
CO 5	To evaluate the known techniques to prepare, recrystallize and finding melting point of simple inorganic Compound
Pre-requisites	

KNOWLEDGE LEVELS			
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing			
CO / PO / KL Mapping **(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)**			
Cos	KLs	POs	KLs
CO 1	2	PO 1	2
		PO 2	3
		PO 3	4
CO 2	4	PO 4	5
		PO 5	1
		PO 6	6
CO 3	1	PO 7	2
		PO 8	3
		PO 9	3
CO 4	1	PO 10	2
		PO 11	4
		PO 12	3
CO 5	3	PO 13	2
		PO 14	4
		PO 15	1

CO / PO Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**Programme Outcome (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	2	1	1	2	2	3	1	2	3	1	2
CO2	1	2	3	2	1	1	1	2	2	1	3	2	1	3	1
CO3	2	1	1	1	3	1	2	1	1	2	1	1	2	1	3
CO4	2	1	1	1	3	1	2	1	1	2	1	1	2	1	3
CO5	2	3	2	1	1	1	2	3	3	2	2	3	2	2	1

Course Assessment Methods			
Direct			
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations			
Indirect			
1. Course End Delivery			
Content of the Syllabus			
Unit - I	**Acidimetry**	Periods	9
	1. Estimation of sodium hydroxide-standard sodiumcarbonate. 2. Estimation of hydrochloric acid- standard oxalicacid. 3. Estimation of Oxalic acid -standard-oxalicacid		
Unit - II	**Permanganometry**	Periods	9
	1. Estimation of oxalic acid – std-Mohr s salt or ferroussulphate. 2. Estimation of sodium nitrite-standard oxalicacid. 3. Estimation of ferrousion.		
Unit - III	**Iodometry**	Periods	6
	1. Estimation of copper-standard Potassiumdichromate. 2. Estimation of Potassium dichromate-standard potassium dichromate		
Unit - IV	**Potentiometry**	Periods	3
	1. Potentiometric titration- Strong acid vs Strong base, 2. Weak acid vs Strong base. 3. Precipitation titration – KCl vs $AgNO_3$		
Unit - V	**INORGANIC PREPARATIONS**	Periods	15
	1. Micro-Cosmicsalt. 2. Potassium trioxalatochromate(III) 3. Ferrous Ammonium sulphate. 4.Tetramminecoppersulphate(II) 5. Tris thiourea copper chloride(I)		
Total Periods			42

Text Books	
1	V. Venkateswaran, R. Veeraswamy and A.R.Kulandaivelu, Basic Principles of Practical Chemistry, New Delhi, S.Chand & Co, (1995).
References	
1	Pandey O. P, Bajpai D. N., Giri S., Practical Chemistry, New Delhi, S.Chand & Co, (2012)
E-References	
1	https //byjus.com/chemistry/volumetric-analysis/
2	https //chem.libretexts.org

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	**B.Sc**	Programme Code	**UCH**			Regulations	**2021-2022**	
Department	**Chemistry**		Semester				**2**	
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
21U2CHAP01	**Allied Chemistry Practicals (Biochemistry and N&D)**				5	5	25	75	100
Course Objectives	To understand the principles of volumetric analysis. To enable the students to have hands-on training on qualitative analysis of organic.							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.							
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.							
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.							
PO 4	Apply one's learning to real life situations.							
PO 5	Analyse and synthesise data from a variety of sources.							
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.							
PO 11	Ability to work independently, identify appropriate resources required for a project.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.							
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.							
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.							
PO 15	Ability to acquire knowledge and skills.							

COs	COURSE OUTCOME
CO 1	Students will learn how to conduct a volumetric estimation process precisely. .
CO 2	Students will understand reactions taking place during the experiment.
CO 3	Students will plan, conduct, review and report the experiment
CO 4	The students will learn the nature, significance, and influence of errors and how they may best be avoided or minimized during quantitative examination of a chemical compound. Students will gain knowledge about analysis of organic compounds.
CO 5	Students will evaluate the reactivity of various functional groups.
Pre-requisites	Nil

KNOWLEDGE LEVELS

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

Cos	KLs	POs	KLs
CO 1	2	PO 1	3
		PO 2	1
		PO 3	4
CO 2	1	PO 4	2
		PO 5	6
		PO 6	2
CO 3	3	PO 7	3
		PO 8	4
		PO 9	2
CO 4	5	PO 10	4
		PO 11	2
		PO 12	4
CO 5	4	PO 13	3
		PO 14	4
		PO 15	2

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**Programme Outcome (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	1	1	3	1	1	1	1	3	2	1	1	2	2	1
CO2	2	3	1	1	2	3	1	3	1	2	2	2	2	2	1
CO3	3	2	1	2	1	2	1	2	2	3	1	1	3	3	1
CO4	1	2	2	1	3	2	1	2	1	1	3	3	1	1	2
CO5	1	1	3	1	2	1	2	1	1	1	2	2	1	1	3

Course Assessment Methods			
Direct			
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations			
Indirect			
1. Course End Delivery			
Content of the Syllabus			
Unit – I	**Volumetric Estimations-Acidimetry**	Periods	9
	1. Estimation of sodium hydroxide-standard sodium carbonate 2. Estimation of Oxalic acid -standard-oxalic acid. 3. Estimation of Hydrochloric acid - standard oxalic acid		
Unit – II	**Permanganometry**	Periods	9
	1.Estimation of oxalic acid-std-Mohrs salt or ferrous sulphate. 2. Estimation of sodium nitrite-standard oxalic acid. 3.Estimation of ferrous ion.		
Unit – III	**Qualitative Organic Analysis**	Periods	9
	Systematic analysis of organic compounds: Characterization of Organic compounds by their functional groups and confirmation by preparation of derivative. Functional groups that may be studied:Aldehydes, Ketones, carboxylic acids.		
Unit – IV	**Qualitative Organic Analysis**	Periods	9
	Systematic analysis of organic compounds: Characterization of Organic compounds by their functional groups and confirmation by preparation of derivative. Functional groups that may be studied: aromatic primary amines, phenol, amide, diamide.		
Unit – V	**Qualitative Organic Analysis**	Periods	9
	Systematic analysis of organic compounds: Characterization of Organic compounds by their functional groups and confirmation by preparation of derivative. Functional groups that may be studied: Nitro compounds and monosaccharides.		
Total Periods			75

Text Books	
1	V. Venkateswaran, R. Veeraswamy and A.R.Kulandaivelu, Basic Principles of Practical Chemistry, New Delhi, S. Chand & Co, (1995).
References	
1	Pandey O. P, Bajpai D. N., Giri S., Practical Chemistry, New Delhi, S.Chand & Co, (2012).
E-References	
1	http://wwwchem.uwimona.edu.jm/lab_manuals/c10expt25.html
2	http://vlab.amrita.edu/?sub=2&brch=191&sim=345&cnt=1
3	http://amrita.olabs.edu.in/?sub=73&brch=8&sim=116&cnt=1

Signature of BOS Chairman

QP CODE-21U2CHC02

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES COLLEGE FOR WOMEN

(Autonomous)

DEPARTMENT OF CHEMISTRY

B.Sc. DEGREE EXAMINATION

MODEL QUESTION- GENERAL CHEMISTRY – II

Time: 3 Hrs. Max.Marks: 75

Section A
Answer all questions (20 x 1 = 20)

1	Which of the compounds is known as Slaked lime?					K1	CO-1
		CaO	B	$CaSO_4$			
		$CaCO_3$	D	$Ca(OH)_2$			
2	Plaster of Paris (POP) is					K1	CO-1
	A	$CaSO_4 H_2O$	B	$CaSO_4 2H_2O$			
	C	$CaSO_4 1/2H_2O$	D	$CaSO_4$			
3	Sulphide ores are concentrated by					K2	CO-1
	A	magnetic separation	B	froth floatation			
	C	hydraulic washing.	D	gravity separation			
4	Heat of ore in presence of air is called					K2	CO-1
	A	calcination	B	smelting			
	C	roasting	D	none of the above			
5	Which is the correct order of decreasing acidity of lewis acids?					K2	CO-2
	A	$BBr_3 > BCl_3 > BF_3$	B	$BF_3 > BCl_3 > BBr_3$			
	C	$BCl_3 > BF_3 > BBr_3$	D	$BBr_3 > BF_3 > BCl_3$			
6	Oxygen is not released on heating which of the compounds?					K1	CO-2
	A	$(NH_4)_2Cr_2O_7$	B	$K_2Cr_2O_7$			
	C	$Zn(ClO_3)_2$	D	$KClO_3$			
7	Name the element purified by electrolysis method					K1	CO-2
	A	Al	B	Fe			

	C	Cu	D	U		
8	What is the ore of aluminium				K1	CO-2
	A	Cuprrite	B	Ferrite		
	C	Bauxite	D	Aluminate		
9	Which is more acidic of the following				K1	CO-3
	A	$CH_2=CH_2$	B	CHΞCH		
	C	$CH_2=CH_2$	D	All of these		
10	Which one of the following product is thermodynamically stable for the 1,2 and1,4 addition of butadiene				K1	CO-3
	A	1,4 adduct	B	1,2 adduct		
	C	Both	D	None		
11	Which one the following is allenes.				K1	CO-3
	A	$CH_2=CH-CH=CH_2$	B	$CH_2=C=CH_2$		
	C	$CH_2=CH-CH_2-CH_3$	D	None of these		
12	Order of reactivity for the addition of hydrogen halides in alkenes				K1	CO-3
	A	HCl > HBr > HI	B	HI > HBr > HCl		
	C	HBr > HI > HCl	D	HI > HCl > HBr		
13	Which is the mildest reducing agent which reduces only carbonyl group in presence of nitro, carboxyl, double bond and ester groups?				K1	CO-3
	A	$LiAlH_4$	B	$Na-NH_3$		
	C	H_2-Ni	D	$NaBH_4$		
14	How acetophenone can be converted to phenol by reaction?				K1	CO-4
	A	m-CPBA followed by base catalysed hydrolysis	B	conc. $HN0_3$		
	C	iodine and NaOH	D	Singlet oxygen followed by base catalysed hydrolysis product		
15	Which of the reagent will give effective transformation of given compounds?				K1	CO-4
	A	CH_2N_2	B	CH_3Li		
	C	$(CH_3)_2CuLi$	D	$Ph_3P = CH_2$		
16	Which of the will give effective reduction of 3-hexyne to trans-3-hexene				K1	CO-4
	A	H_2/Lindlar's catalyst	B	Na/liq. NH_3		

	C	Fe/NaCl	D	DIBAL		
17	What will be the pH of a buffer solution having an equal concentration of B^- and HB ($K_b = 10^{-10}$ for B^-)				K1	CO-5
	A	7	B	6		
	C	4	D	10		
18	Find the conjugate acid of NH_2^-				K1	CO-5
	A	NH_3	B	NH_4OH		
	C	NH_4^+	D	NH_2^-		
19	On increasing the concentration of reactants in a reversible reaction, then equilibrium constant will				K1	CO-5
	A	depend on the concentration	B	increase		
	C	unchanged	D	decrease		
20	Find the pH of a solution when 0.01 M HCl and 0.1 M NaOH are mixed in equal volumes				K1	CO-4
	A	12.65	B	1.04		
	C	7.0	D	2.0		
	Section B **Answer All questions (5 x 5 = 25)**					
21	A	Write down the general characteristics of s-block elements a) Alkali metals b) Alkali earth metals			K2	CO-1
		OR				
	B	Define electrolysis and explain zone refining process			K2	CO-1
22	A	Write down the classification of oxides.			K2	CO-2
		OR				
	B	Synthesis of diborane and higher borane			K3	CO-2
23	A	Discuss in detail about 1,2 and 1,4 addition reaction			K3	CO-3
		OR				
	B	Write the conformational structures of cyclobutane and cyclopentane.			K2	CO-3
24	A	Discuss organozinc and organolithium reagent.			K2	CO-4
		OR				
	B	Elucidate Woodward Prevorst hydroxylation reagent			K2	CO-4
25	A	Define Phase rule and explain one component system			K2	CO-5
		OR				

	B	Explain the equilibrium constants and their quantitative dependence on temperature, pressure and concentration.	K2	CO-5
Section C **Answer ANY THREE Questions (3 x 10 = 30)**				
26		Explain froth floatation, magnetic separation, calcination and roasting processes	K4	CO-1
27		Explain the preparation and reactions of hydrazine and hydroxylamine	K3	CO-2
28		A) Explain Hofmann and saytzeff'srule. B) Explain Freunds and Wislicenus methods	K3	CO-3
29		Synthesis and applications of BF3, NBS and Diazomethane	K3	CO-4
30		Discuss the relation between Gibbs free energy of reaction and reaction quotient	K4	CO-5

TABLE OF SPECIFICATIONS (Question wise – No. of questions)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	2	4	-	1	-	-	7
II	3	2	2	-	-	-	7
III	5	-	2	-	-	-	7
IV	4	2	1	-	-	-	7
V	5	1	-	1	-	-	7
Total	19	10	5	2	-	-	35

TABLE OF SPECIFICATIONS (Marks wise – Total marks)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	6	4	-	10	-	-	20
II	3	5	10	-	-	-	18
III	9	-	10	-	-	-	19
IV	4	10	20	10	-	-	44
V	9	-	-	10	-	-	19
Total	31	19	40	30	-	-	120

QP CODE-21U2CHA02

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
B.Sc., DEGREE EXAMINATION
MODEL QUESTION- ALLIED CHEMISTRY – II
(BIO-CHEMISTRY)

Time: 3 Hrs. Max.Marks:75

Section A
Answer all questions (10 x 1 = 10)

1	Which technique is used to separate the the compounds on the basis of differencein affinities ofphase				K1	CO-1
	A	Chromatography	B	Polarography		
	C	Thermography	D	Chromography		
2	Which of the following is the most sensitive of the spectral methods?				K1	CO-1
	A	Absorption spectroscopy	B	Mass spectroscopy		
	C	Flame emission spectroscopy	D	Atomic emission spectroscopy		
3	GC- MS has been developed for which of the following systems?				K1	CO-1
	A	Packed column	B	Open tubular column		
	C	Capillary column	D	Porous layer column		
4	Which type of chromatography is applied to coloured and colourless substance				K3	CO-1
	A	Paper	B	Column		
	C	Thin layer	D	HPLC		
5	Aminoacidscontain ----------functionalgroups				K2	CO-2
	A	1	B	2		
	C	3	D	4		
6	---------- is the pH at which the amino acid does not migrate in an electric field.				K2	CO-2
	A	Isoelectric point	B	electric point		
	C	Electronic point	D	None		
7	The microorganisms secrete an enzyme which helps in the digestion of cellulose is known as				K3	CO-2
	A	Cellulase	B	Catalase		
	C	Sucrase	D	Pepsin		

8	Aldehyde group present in carbohydrate is known as------				K2	CO-2
	A	Aldose	B	Ketose		
	C	Hexose	D	Sucrose		
9	Vitamins areclassifiedinto ---------- types.				K2	CO-3
	A	2	B	3		
	C	4	D	5		
10	Which element present in the chlorophyll?				K2	CO-3
	A	Mg	B	Ca		
	C	P	D	CO		
11	Basic unit of Phorphyrin				K2	CO-3
	A	Indole	B	Imdazole		
	C	Quinole	D	Pyrole		
12	Which element is present in the haemoglobin?				K4	CO-3
	A	Cu	B	Ag		
	C	Fe	D	Au		
13	Which metal found in vitamin B12?				K1	CO-4
	A	Co	B	Cu		
	C	Mg	D	Sn		
14	Which one is example for Narcotic analgesics?				K1	CO-4
	A	Morphine	B	Papaverine		
	C	salicyladehyde	D	Benzoicacid		
15	Salicyladehyde group of Aspirin				K2	CO-4
	A	$COOCH_3$	B	CHO		
	C	Cl	D	NO_2		
16	p-aminophenol used for				K2	CO-4
	A	Pain reliver	B	Anti-inflammatory		
	C	Anti-septic agent	D	anti-bacterial drugs		
17	Which among the following compound found only in liquid nature?				K2	CO-5
	A	Amine	B	Acid		
	C	Monoamide	D	All		
18	Which compound shows aliphatic nature?				K1	CO-5
	A	Carbohydrate	B	amine		
	C	Monoamide	D	Acid		

19	Which among the following compounds contain nitrogen?					K2	CO-5
	A	Aldehyde	B	amine			
	C	Acid	D	Alcohol			
20	Which test gives positive result for amides.?					K3	CO-5
	A	Biuret test	B	Silver mirror test			
	C	Lieberrmanns test	D	Phthalein fusion test.			
	Section B **Answer All questions (5 x 5 = 25)**						
21	A	Similarities and differencebetween GC/MS and ion chromatography.				K4	CO-1
		OR					
	B	Write short notes on methods of separation of column chromatography				K3	CO-1
22	A	Explain the preparation of amino acids by Gabriel method and strecker's synthesis				K2	CO-2
		OR					
	B	Write the preparation of glucose.				K4	CO-2
23	A	Role of alkali and alkaline earth metal ions in biological system				K1	CO-3
		OR					
	B	Write short notes on nitrogen fixation.				K4	CO-3
24	A	Explain the mode of Action of paracetamol& ibuprofen.				K3	CO-4
		OR					
	B	Explain the analgesics with examples.				K2	CO-4
25	A	How will you find out the given organic compound as aliphatic or aromatic and saturation or unsaturation?				K1	CO-5
		OR					
	B	Write an elemental test for N, S and halogens				K1	CO-5
	Section C **Answer ANY THREE Questions (3 x 10 = 30)**						
26		Explain the instrumentation and application of HPLC.				K3	CO-1
27		Structure, properties and Classification of proteins				K1	CO-2
28		Explain oxygen transport and respiration.				K3	CO-3
29		Explain the classification of Anesthetics with example.				K1	CO-4
30		How will you identify the given organic compound as phenol and aldehyde?				K2	CO-5

TABLE OF SPECIFICATIONS (Question wise – No. of questions)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	3	0	3	1	0	0	7
II	1	4	1	1	0	0	7
III	1	3	1	2	0	0	7
IV	3	3	1	0	0	0	7
V	3	3	1	0	0	0	7
Total	20	10	2	2	1	0	35

TABLE OF SPECIFICATIONS (Marks wise – Total marks)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	3	0	16	5	0	0	24
II	10	8	1	5	0	0	24
III	5	3	10	6	0	0	24
IV	12	7	5	0	0	0	24
V	11	12	1	0	0	0	24
Total	41	30	33	16	0	0	120

QP CODE- 20U1CHA02

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES COLLEGE FOR WOMEN

(Autonomous)

DEPARTMENT OF CHEMISTRY

MODEL QUESTION- ALLIED CHEMISTRY-II

Time: 3 Hrs. **Max.Marks : 75**

Section -A

Answer all questions (20x1=20)

1	Write the name of the following complexes:$[CoCl_3(NH_3)_3]$					K3	CO-1
	A	Triamminetrichlorocobalt(III)	B	Trichlorotriamminecobalt(III)			
	C	Triamminecobalt(III)trichloride	D	Triamminecobalt(II)chloride			
2	In coordination chemistry, the donor atom of a ligand is					K1	CO-1
	A	a Lewis acid	B	the counter ion			
	C	the counter ion	D	the atom in the ligand that shares an electron pair with the metal			
3	The shape of $CHCl_3$ molecule is					K3	CO-1
	A	Linear	B	Pyramidal			
	C	Tetrahedral	D	Trigonal bipyramidal			
4	Which of the following are the types of Chlorophyll?					K1	CO-1
	A	Chlorophyll a	B	Chlorophyll b			
	C	Chlorophyll c1	D	All of them			
5	Plants convert glucose ($C_6H_{12}O_6$) in to					K2	CO-2
	A	Starch only	B	Cellulose only			
	C	Sucrose	D	Starch and cellulose			
6	Fructose ($C_6H_{12}O_6$) is very uncommon in					K2	CO-2
	A	Animals	B	Plants			
	C	Herbs	D	Ferns			
7	The simplest amino acid is					K2	CO-2
	A	Glycine	B	Alanine			
	C	Asparagine	D	Tyrosine			
8	Starch is commonly formed and stored in					K1	CO-2
	A	Animals	B	Plants			
	C	Fish	D	Insects			

9	At normal the pH value of penicillin remains in_____.				K4	CO-3
	A	Solvent phase	B	Precipitates		
	C	Aqueous phase	D	Both (a) and (b)		
10	HIV is thought to have originated from				K2	CO-3
	A	Birds	B	Mosquitos		
	C	Chimpanzees	D	None of the above		
11	Antibiotics are used to treat infections by				K3	CO-3
	A	Virus	B	Bacteria		
	C	All the microorganisms	D	None of the above		
12	Which of the following species is used for producing streptomycin?				K2	CO-3
	A	S. ramosus	B	S. griseus		
	C	S. aureofaciens	D	S. griseoflavus		
13	Gibbs phase rule for general system				K3	CO-4
	A	P+F=C-1	B	P+F=C+1		
	C	P+F=C-2	D	P+F=C+2		
14	The degree of freedom at triple point in unary diagram for water _____				K5	CO-4
	A	0	B	1		
	C	2	D	3		
15	_____ is also known as Principle of Quantum Activation				K2	CO-4
	A	Lambert's law	B	Beer's law		
	C	Stark-Einstein law	D	Stark law		
16	Grothus – Draper law is _____ in nature				K2	CO-4
	A	Purely qualitative	B	Qualitative and quantitative		
	C	Quantitative	D	non-acceptable		
17	Chemical used in salt bridge is				K2	CO-5
	A	KOH	B	KCl		
	C	KNO_2	D	KBr		
18	The value of E^o is known as				K1	CO-5
	A	Standard electrode potential	B	Standard cell potential		
	C	Standard charge potential	D	Standard ion potential		
19	Which of the following cannot be used as secondary reference electrode?				K3	CO-5
	A	Calomel electrode	B	Silver-silver chloride electrode		
	C	Mercury-mercury sulphate electrode	D	Glass electrode		

20	Electric potential and Electromotive force (EMF) are				K3	CO-5
	A	Different terms	B	Have different units		
	C	Same terms	D	Undefined terms		
	Section B **AnswerAllquestions (5x5= 25)**					
21	A	Determine the EAN of the central metal atom in the following complexes: $K_4[Fe(CN)_6]$, $K_2[Cd(CN)_4]$.			K5	CO-1
		OR				
	B	Write briefly or biologically importance of haemoglobin.			K2	CO-1
22	A	How are Glycine and Alanine are prepared?			K2	CO-2
		OR				
	B	Write the preparation and structure of Fructose?			K3	CO-2
23	A	Write the structure of chloramphenicol?			K1	CO-3
		OR				
	B	What is meant by antipyretics and transquilizers with suitable example?			K2	CO-3
24	A	Discuss about the Grotthus-Draper law in photochemistry.			K3	CO-4
		OR				
	B	Write short notes on phosphorescence and fluorescence.			K2	CO-4
25	A	Explain the Galvanic cell with neat diagram?			K3	CO-5
		OR				
	B	Discuss the prevention methods of corrosion.			K2	CO-5
	SectionC **Answer ANY THREE Questions (3x10= 30)**					
26		How does Werner's co-ordination theory explain the formation of complex compounds?			K3	CO-1
27		Explain the structural Elucidation of Glucose?			K2	CO-2
28		Explain the preparation and uses of sulphadiazine?			K2	CO-3
29		Explain the neat diagram about simple eutectic (Pb-Ag) system.			K2	CO-4
30		State and explain Kohlraush's law and its applications.			K3	CO-5

TABLE OF SPECIFICATIONS (Question wise – No. of questions)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	3	4	0	0	0	0	7
II	3	3	0	1	0	0	7
III	4	2	0	1	0	0	7
IV	4	2	1	1	0	0	7
V	3	1	0	2	1	0	7
Total	17	12	1	5	1	0	35

TABLE OF SPECIFICATIONS (Marks wise – Total marks)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	6	18	0	0	0	0	24
II	3	20	0	1	0	0	24
III	17	6	0	1	0	0	24
IV	12	10	0	2	0	0	24
V	7	10	5	2	0	0	24
Total	45	64	05	06	0	0	120

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.						
Programme	**B.Sc**	Programme Code	**UCH**		Regulations		**2018-2019**
Department	**Chemistry**		Semester				**3**
Course Code	Course Name		Periods per Week	Credit	Maximum Marks		
			L P	C	CA	ESE	Total
18U3CHC03	**Core Paper –III** **General Chemistry-III**		6 0	5	25	75	100
COURSE OBJECTIVES	To acquire knowledge about the fundamentals and principles of chemistry.2.To educate the students about the functional groups of organic compounds.3.To understand the concept of thermodynamic terms.						

POs	**PROGRAMME OUTCOME**
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme ofstudy.
PO 2	Ability to express thoughts and ideas effectively in writingand orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,
PO 3	Capability to apply analytic thought to a body of knowledge;analyse and evaluate evidence,arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.
PO 5	Ability to evaluate the reliability and relevance of evidence;identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusionsetc.,
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group,and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.
PO 10	Capability to use ICT in a variety of learning situations,demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.

PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,

COs	**COURSE OUTCOME**
CO 1	Students gain the knowledge of preparation, properties and uses of some important d-block metal Compounds
CO 2	Students know different types of hydrides, preparation, properties and its uses.
CO 3	Students study about preparation, properties and uses of alcohols, phenols and aromatic hydrocarbons
CO 4	Students learn about preparation, properties of aldehydes, ketones and some naming reactions
CO 5	Students able to study about the thermodynamic terms and laws.
Pre-requisites	

Knowledge Levels			
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing			
CO / PO / KL Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)			
COs	**KLs**	**POs**	**KLs**
CO 1	2	PO 1	2
		PO 2	1
CO 2	1		
		PO 3	5
CO 3	3	PO 4	5
		PO 5	4
CO 4	6	PO 6	6
		PO 7	2
CO 5	5		
		PO 8	4
PSOs	**KLs**	PO 9	1
		PO 10	3
PSO 1	3		
		PO 11	3
		PO 12	2
PSO 2	4		
		PO 13	1
PSO 3	1	PO 14	6
		PO 15	3

CO / PO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	**PROGRAMME OUTCOME (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO2	2	3	1	1	1	1	2	1	3	1	1	2	3	1	1
CO3	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3
CO4	1	1	2	2	1	3	1	1	1	1	1	1	1	3	1
CO5	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1

CO / PSO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					
COs	Programme Specific Outcome (**PSOs**)				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	1	3	1	1
PSO2	1	1	2	1	2
PSO3	2	3	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II &Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Transition elements**	Periods	12
	The d - block elements - Position in the periodic table - Electronic configuration- General characteristics of d - block elements. Occurrence - extraction, properties and uses of Mo and Pt. Important compounds of transition metals: preparation, properties and uses of Ziegler - Natta catalyst, Prussian blue, Sodium nitro prusside, Turnbull's blue, Nickel DMG complex, Wilkinson's Catalyst, KMnO4, ammonium molybdate and K2Cr2O7.		
Unit - II	**Hydrides**	Periods	12
	Hydrides - Classification of hydrides - Ionic Hydrides: LiH, NaH - preparation, properties, uses. Covalent Hydrides: Silanes - Chemistry of Mono and Disilanes - Boron hydrides - preparation, properties and structure of Diborane. Complex Hydrides: $NaBH_4$, $LiAlH_4$ - structure, preparation, properties and uses.		

Unit - III	**Alcohols, Phenols and aromatic hydrocarbons**	Periods	12
	Aliphatic alcohols: Introduction - Nomenclature - preparation, properties and distinction between 1^{o}, 2^{o} and 3^{o} alcohols - Aromatic alcohols: Introduction - preparation and properties of benzyl alcohol.Phenol and its types: Introduction - acidity - preparation, properties and uses of phenol. Dihydric phenols: Introduction - preparation of catechol, resorcinol and quinol. Trihydric phenols: Introduction - preparation of pyrogallol, hydroxyquinol, phloroglucinol. Aromatic hydrocarbons: Aromaticity – Huckel's rule - Electrophilic substitution reactions in aromatic compounds (general mechanism only).		
Unit - IV	**Carbonyl compounds**	Periods	12
	Introduction - structure of carbonyl compounds - Nomenclature - Preparation and properties of aldehydes and ketones. Chemical properties: Addition reactions, Reactions involving alkyl groups, reduction and oxidation reactions and some important name reactions - Haloform, Reformatsky reaction, Aldol condensation, pinacol-pinacolone rearrangement, Wittig Reaction - Chemistry of acetone and acetaldehyde.		
Unit - V	**Thermodynamics – I**	Periods	12
	Thermodynamic terms - system, surrounding and boundary - homogenous and heterogeneous system - types of thermodynamic system - state of system - equilibrium and non equilibrium state - nature of work and heat - law of conservation of energy - First law of thermodynamics - Enthalpy of a system - Heat capacity of a system - work done in reversible isothermal compression - work done in reversible adiabatic expansion - Joule Thomson effect, Joule Thomson coefficient, inversion temperature - zeroth law of thermodynamics - absolute temperature scale .		
Total Periods			**60**

Text Books	
1	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry (33rd edition), Vishal publishing co., (2017).
2	Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry, (47th edition) Vishal publishing co., (2017).
3	Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (22nd edition), New Delhi, S. Chand & Co., (2016).
References	
1	Morrison R.T. and Boyd R.N., Organic Chemistry (6th edition), New York,Allyn& Bacon Ltd.,(1992).
2	Madan.R.D., Inorganic Chemistry (3rd edition), New Delhi, S. Chand and Co., (2012).
3	Mukherji.S.M, Singh.S.P, Kapoor.R.P, Organic Chemistry volume I (4thedition)New Age International (p) limited(1998).
E-References	
1	https://www.askiitians.com/iit-jee-chemistry/inorganic-chemistry/hydrogen /hydrides .html

2	nsdl.niscair.res.in/jspui/bitstream/123456789/778/1/Revised%20 thermodynamics.pdf
3	https://www.askiitians.com/iit-jee-chemistry/organic-chemistry/carbonyl-compounds/aldehydes-and-ketone s/chemical-properties-of-aldehydes-and-ketones.html

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205**.**						
Programme	**B.Sc**	Programme Code	**UCH**		Regulations		**2018-2019**
Department	**Chemistry**		Semester				**3**
Course Code	Course Name		Periods per Week	Credit	Maximum Marks		
			L / P	C	CA	ESE	Total
18U3CHA01	**Allied Chemistry – I (Botany/Zoology)**		5 / 0	5	25	75	100
COURSE OBJECTIVES	To impart knowledge in formation of molecule from atoms and various organic reaction mechanism, To prepare students for a carrier in chemical industries and To acquire basic knowledge in fundamental aspects of practical chemistry.						
POs	**PROGRAMME OUTCOME**						
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme ofstudy.						
PO 2	Ability to express thoughts and ideas effectively in writingand orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,						
PO 3	Capability to apply analytic thought to a body of knowledge;analyse and evaluate evidence,arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,						
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.						
PO 5	Ability to evaluate the reliability and relevance of evidence;identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusionsetc.,						
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,						
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group,and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.						
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.						
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.						
PO 10	Capability to use ICT in a variety of learning situations,demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.						
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.						

PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,

COs	**COURSE OUTCOME**
CO 1	Students learn about bonding, anti bonding, non bonding and Interhalogen compounds.
CO 2	Students acquire knowledge about the fundamental concepts of acid and base and to determine the hardness of water.
CO 3	Students able to apply the knowledge to prepare various concentration of solution.
CO 4	Students understand about the various antibiotics and drugs.
CO 5	Students evaluate the characteristics of soil, fertilizers and pesticides.
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

Cos	**KLs**	**POs**	**KLs**
CO 1	5	PO 1	2
		PO 2	1
CO 2	2		
		PO 3	5
CO 3	3	PO 4	5
		PO 5	4
CO 4	4	PO 6	6
		PO 7	2
CO 5	2		
		PO 8	4
PSOs	**KLs**	PO 9	1
		PO 10	3
PSO 1	3		
		PO 11	3
		PO 12	2
PSO 2	4		
		PO 13	1
PSO 3	1	PO 14	6
		PO 15	3

CO / PO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	**PROGRAMME OUTCOME (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3
CO4	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO5	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2

CO / PSO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					
COs	Programme Specific Outcome (**POs**)				
	CO1	CO2	CO3	CO4	CO5
PSO1	1	2	3	2	2
PSO2	2	1	2	3	1
PSO3	1	2	1	1	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II &Model 2. Assignment 3. End SemesterExaminations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Chemical bonding and Aromaticity**	Periods	12
	Chemical Bonding Definition types Ionic bond and covalent bond, hydrogen bond -formation and characteristics properties -bond order- magnetic properties. Structure of NaCl, CaF_2. MO theory-bonding in H_2, O_2, N_2 using MO theory -bonding -bond order- magnetiic properties. Aromaticity -Huckels rule-types -Examples.		
Unit - II	**Acid and Base theory**	Periods	12
	Arrhenius concept - Lowry-bronsted theory -Lewis acid and base theory - Conjugated Acid and base-Strength of an Acid and base. Principle and Classification of Hard acid and Base -Soft Acid and base-HSAB. Acidity of water - Alkalinity-PH -hardness of water- types of hardness - methods RO and Zeolite process.		

Unit - III	**Volumetric analysis**	Periods	12
	Law of Volumetric analysis-Definitions of molarity, molality, normality and mole fraction. Titration-Back titration-Equivalence point-Indicator - Standard solution - Primary and secondary standards- Types of titrations- Acid-base and redox.		
Unit - IV	**Pharmaceutical Chemistry-I**	Periods	12
	Definition of the terms - Drug, Pharmacy, Pharmacophore, Pharmacodynamics and Pharmacopoeia. Antibiotics - Definition, classification - broad and narrow spectrum antibiotics. penicillin, chloramphenical and erythromycin - structure and uses -structure elucidation not needed. Sulpha drugs-preparation of sulphaguanine and sulphathiazole. Mechanism and mode of action of sulpha drugs.		
Unit - V	**AgriculturalChemistry**	Periods	12
	Soil types-red soil, black soil, alluvial soil, desert soil, red soil; role of humus: Manures and their importance. Chemical fertilizers- Natural and synthetic fertilizers: Classification of NPK fertilizer-Preparation of Urea, Ammonium sulphate, Triple super phosphate potassium nitrate; role of macronutrients and micronutrients. Pesticides- classification-insecticides, herbicides and fungicides- Structure of important pesticides: DDT, BHC.		
Total Periods			**60**

Text Books	
1	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry (33rd edition), Vishal publishing co., (2017).
2	Jayashree Ghosh .S, Fundamental concepts of Applied Chemistry, New Delhi, S. Chand & Co., (2008).
3	Sharma B.K., Industrial chemistry including chemical engineering (16th), Meerut, Krishnaprakasam media., (2011).
4	Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (22nd edition), New Delhi, S. Chand & Co., (2016).
5	Dr.R.D.Madan, Modern inorganic chemistry,(3rd edition), New Delhi,S. Chand & Co., (2014).
References	
1	Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry , 47th edition, Vishal publishing co., 2017.
2	Jayashree Ghosh, Text Book of Pharmaceutical Chemistry, S. Chand, New Delhi,1999.
3	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry , 50th edition, New Delhi, S. Chand &Co., 2011.
E-References	
1	www.sparknotes.com/chemistry/bonding/molecularorbital/section1.rhtm

2	www.organic-chemistry.org/namedreactions/nucleophilic-substitution-sn1-sn2.shtm
3	www.soest.hawaii.edu/oceanography/courses/OCN633/Fall%202013/Titrimetry.pdf
4	chem.libretexts.org/

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	**B.Sc**	Programme Code	**UCH**			Regulations	**2018-2019**	
Department	**Chemistry**		Semester				**3**	
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L		P	C	CA	ESE Total
18U3CHA03	**Allied Chemistry – I (Physics)**		5		0	5	25	75 100
COURSE OBJECTIVES	To provide a broad foundation in chemistry that stresses scientific reasoning and analytical problem solving with a molecularperspective. To expose the students to a breadth of experimental techniques using instrumentation.							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme ofstudy.							
PO 2	Ability to express thoughts and ideas effectively in writingand orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,							
PO 3	Capability to apply analytic thought to a body of knowledge;analyse and evaluate evidence,arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,							
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.							
PO 5	Ability to evaluate the reliability and relevance of evidence;identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusionsetc.,							
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group,and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations,demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.							
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,							

PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,

COs	**COURSE OUTCOME**
CO 1	Students will be known molecular orbital theory and types of interhalogens.
CO 2	Students can understand organic reactions and types of hybridization
CO 3	Students will be enhanced their knowledge towards electrolysis, conductance and buffer solutions.
CO 4	Students will learn the basics of pharmaceutical chemistry.
CO 5	Students will gain knowledge about corrosion and its preventive methods.
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

Cos	**KLs**	**POs**	**KLs**
CO 1	4	PO 1	2
		PO 2	1
CO 2	2		
		PO 3	5
CO 3	5	PO 4	5
		PO 5	4
CO 4	6	PO 6	6
		PO 7	2
CO 5	3		
		PO 8	4
PSOs	**KLs**	PO 9	1
		PO 10	3
PSO 1	3		
		PO 11	3
		PO 12	2
PSO 2	4		
		PO 13	1
PSO 3	1	PO 14	6
		PO 15	3

CO / PO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	**PROGRAMME OUTCOME (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1
CO4	1	1	2	2	1	3	1	1	1	1	1	1	1	3	1
CO5	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3

CO / PSO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					
COs	**Programme Specific Outcome (POs)**				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	2	1	1	3
PSO2	3	1	2	1	2
PSO3	1	2	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II &Model 2. Assignment 3. End SemesterExaminations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Covalent bonding**	Periods	12
	Covalent bond-Hybridization-Definition -Salient features-VSEPR theory - Shapes of inorganic molecules such as BF_3, H_2O, NH_3,ClF_3 and XeF_2. Molecular orbital theory - Postulates-bonding,anti bonding an non-bonding molecular orbital-Bond order-MO diagram for H_2, He_2,N_2,O_2,F_2,NO and CO		
Unit - II	**Organic Reactions**	Periods	12
	Classification of reactions-substitution,addition,elimination reactions-explanation.Isomerization, polymerization and condensation definition with examples.Hybridization in methane,ethylene, acetylene.Aromaticit Huckels rule.Electrophilic substitution reactions in benzene - Mechanism of nitration,sulphonation,halogenation and alkylation		

Unit - III	**Electrochemistry-I**	Periods	12
	Electrolytic conduction-Faradays law of electrolysis-Conductance of electrolytes-Specific conductance,equivalent conductance, molar conductance-variation of molar conductance with dilution - Kohlrausch law and its application-Conductometric titrations-Ostwald dilution law-pH definition Common ion Effec-Buffer solutions - Definition -Henderson equation -Derivation-Indicators-Acid-base Indicators		
Unit - IV	**Pharmaceutical Chemistry-I**	Periods	12
	Antibiotics-Definition, classification - broad and narrow spectrum antibiotics. penicillin, chloramphenical and erythromycin-structure and mode of action structure elucidation not needed. Sulpha drugs - preparationof sulphaguanidine, sulphapyridine and sulphathiazole. Mechanism and mode of action of sulpha drugs		
Unit - V	**Applied Chemistry-I**	Periods	12
	Corrosion-Types of corrosion - Dry and Wet corrosion definition only-Prevention of corrosion by electroplating. Paints - Requirements of good paint- constituents of paints and their functions- manufacture of paints -special paints: luminescent fire retardant and heat resistant paints. Varnishes -Constituents, characteristics of good varnish, types and uses.		
Total Periods			30

Text Books	
1	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry 33rd edition,Vishal publishing co., 2017.
2	Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, 22nd edition, New Delhi S. Chand & Co., 2016.
3	Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry , 47th edition, Vishal publishing co., 2017.
References	
1	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry 50th edition, New Delhi, S. Chand &Co.,2011.
2	Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry 23rd edition, New Delhi, S. Chand &Co., 2004.
E-References	
1	https://chem.libretexts.org/Core/Physical_and_Theoretical_Chemistry/Chemical_Bonding/Molecular_Orbital_Theory/MO_bonding_in_F2_and_O2.
2	https://www.cliffsnotes.com/study-guides/chemistry/organic-chemistry-ii/reactions-of-aromatic-compounds/electrophilic-aromatic-substitution-reactions

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	**B.Sc**	Programme Code	**UCH**			Regulations	**2018-2019**	
Department	**Chemistry**		Semester				**3**	
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L		P	C	CA	ESE	Total
18U3CHN01	**Industrial Chemistry**		3		0	5	25	75	100
COURSE OBJECTIVES	To learn the importance of water chemistry. To understand the manufacturing of soaps,detergents and glass of different typesTo enable the students to learn about the preparation and importance of various industrial products							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme ofstudy.							
PO 2	Ability to express thoughts and ideas effectively in writingand orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,							
PO 3	Capability to apply analytic thought to a body of knowledge;analyse and evaluate evidence,arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,							
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.							
PO 5	Ability to evaluate the reliability and relevance of evidence;identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusionsetc.,							
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group,and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations,demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.							

PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,

COs	**COURSE OUTCOME**
CO 1	Students will be known the various methods involved in water quality analysis
CO 2	Students canunderstandthe manufactureof soap and detergents.
CO 3	Students will be enhanced their knowledge towards manufacture of glass.
CO 4	Students will learn the basic concepts involved in lubricants.Students will gain knowledge about petroleum products
CO 5	Students will learn how to conduct a volumetric estimation process precisely
Pre-requisites	

Knowledge Levels			
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing			
CO / PO / KL Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)			
COs	**KLs**	**POs**	**KLs**
CO 1	2	PO 1	2
CO 2	2	PO 2	1
		PO 3	5
CO 3	3	PO 4	5
		PO 5	4
CO 4	4	PO 6	6
		PO 7	2
CO 5	4	PO 8	4
PSOs	**KLs**	PO 9	1
		PO 10	3
PSO 1	3	PO 11	3
		PO 12	2
PSO 2	4	PO 13	1
PSO 3	1	PO 14	6
		PO 15	3

CO / PO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	**PROGRAMME OUTCOME (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3
CO4	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO5	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2

CO / PSO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					
COs	Programme Specific Outcome (**POs**)				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	2	3	2	2
PSO2	1	1	2	3	3
PSO3	2	2	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II &Model 2. Assignment 3. End SemesterExaminations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Water chemistry- I**	Periods	6
	Examination of water quality by chemical and physical examination of water: colour - turbidity - odour-taste-temperature-pH-electrical conductivity-suspended solids - dissolved solids - acidity-total acidity-alkalinity - free CO_2 - dissolved O_2-free chlorine-chlorine demand - BOD -COD.		
Unit - II	**Soaps and detergents**	Periods	6
	Soaps:manufacture-toilet and transparent soap -metal soaps,cleansing action of soap. Detergents:Manufacture of synthetic detergents-anionic detergents-cationic detergents and amphoteric detergents		
Unit - III	**Glass industry**	Periods	6
	Glass-physical and chemical properties of glass-characteristics-manufacture: formation of batch material-melting-shaping-annealing-finishing-special glass:optical,borosilicate and coloured glass		

Unit - IV	**Lubricants**	Periods	6
	Definition-functions - properties - viscosity index-pour point - cloud point - classification - additives for lubricants- grease-solid lubrication-emulsions		
Unit - V	**Petroleum and Petrochemicals**	Periods	6
	Cracking - mechanism,changes occurring during cracking - types - applications - synthetic petrol - Hydrogenation of coal Bergius process - Fischer tropsch process - knocking and anti knocking agents - octane number		
Total Periods			30

Text Books	
1	Industrial chemistry by B.N.Chakrabarty, Oxford and IBH publishing Co, NewDelhi,1981.
2	Industrial chemistry by B.K.Sharma,Goel Publishing House, Meerut.
4	
References	
1	College Industrial chemistry by P.P.Singhn, T.M.Joseph, R.G.Dhanvale, Himalaya Publishing house, Bombay 4th edition, 1983
2	Applied chemistry by Jayashree Ghosh, S.Chand Publication Reprint 2013
E-References	
1	https://www.scribd.com/document/274281762/Water-Technology-Ppt
2	nptel.ac.in/courses/103107082/module6/lecture5/lecture5.pd

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	**B.Sc**	Programme Code	**UCH**			Regulations		**2018-2019**
Department	**Chemistry**		Semester					**3**
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L		P	C	CA	ESE / Total
18U3CHN02	**Medicinal Chemistry**		3		0	2	25	75 / 100
COURSE OBJECTIVES	1.To study the system of Indianmedicines 2.To learn the importance and evaluation of drugs. 3.To prepare and analyse thedrugs.							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme ofstudy.							
PO 2	Ability to express thoughts and ideas effectively in writingand orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,							
PO 3	Capability to apply analytic thought to a body of knowledge;analyse and evaluate evidence,arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,							
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.							
PO 5	Ability to evaluate the reliability and relevance of evidence;identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusionsetc.,							
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group,and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations,demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.							
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.							

PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,

COs	**COURSE OUTCOME**
CO 1	Students known the systems of Indian medicines
CO 2	Students able to understand the drugs.
CO 3	Students enhanced their knowledge towards preparation of drugs.
CO 4	Students learn the importance of medicinal plants.
CO 5	Students know to analyse the drug and its quality.
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**KLs**	**POs**	**KLs**
CO 1	2	PO 1	2
		PO 2	1
CO 2	2		
		PO 3	5
CO 3	3	PO 4	5
		PO 5	4
CO 4	4	PO 6	6
		PO 7	2
CO 5	4		
		PO 8	4
PSOs	**KLs**	PO 9	1
		PO 10	3
PSO 1	3		
		PO 11	3
		PO 12	2
PSO 2	4		
		PO 13	1
PSO 3	1	PO 14	6
		PO 15	3

CO / PO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	**PROGRAMME OUTCOME (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3
CO4	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO5	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2

CO / PSO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					
COs	**Programme Specific Outcome (POs)**				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	2	3	2	2
PSO2	1	1	2	3	3
PSO3	2	2	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II &Model 2. Assignment 3. End SemesterExaminations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Introduction to Pharmacognosy**	Periods	6
	History, Definition and scope of pharmacognosy; Systems of Indian Medicines - Siddha, Unani, Ayurveda, Homeopathy; Terminologies.		
Unit - II	**Classification of drugs**	Periods	6
	Classification of Crude drugs - Taxonomical, Morphological, Pharmacological and chemical classifications; Chemistry of drugs and its evaluation.		
	Preparation and Application of Drugs	Periods	6
Unit - III	Preparation of crude and commercial drugs. Making infusion, decoction, lotion, washers, insect repellents, suppositories, tincture, making herbal syrups, compresses, poultice, plasters, oinments, herbal oils and herbal salves. Surgical fibres, sutures and dressing.		

Unit - IV	**Plants as Drugs**	Periods	6
	Organoleptic study of the following medicinal plants: Fruit - Amla, Bulb - Garlic, Rhizome - Ginger, seed - castor, Bark - Cinchona, Leaves - Neem, Flower - Clove.		
	Analytical Studies	Periods	6
Unit - V	Analytical Pharmacognosy - drug adultration and detection. Biological testing of herbal drug. Phytochemical investigations with reference to secondary metabolites of locally available medicinal plants.		
	Total Periods		**30**

Text Books	
1	S.Lakshmi, Pharmaceutical Chemistry, S.Chand & Sons ,New Delhi,2004.
2	V.K.Ahluwalia and Madhu Chopra, Medicinal Chemistry ,Ane Books,New Delhi,Reprint 2009.
3	Industrial chemistry by B.N.Chakrabarty, Oxford and IBH publishingCo,NewDelhi, 1981.
4	Industrial chemistry by B.K.Sharma, Goel Publishing House, Meerut.
References	
1	Pharmacognosy, S.B.Gokhale, Dr.C.K. Kokate, A.P. Purohit, Publisher: Nirali Prakasham, Pune, 2002
2	Herbs that Heal, Acharya Vipul Rao â€“ Diamond Pocket Books, New Delhi, 2005
3	Practical Pharmacognosy. Dr.C.K. Kokate et al. 2003
4	An Introduction to Medicinal Botany and Pharmacognosy â€“ N.C. Kumar, Emkay Publications, New Delhi, 2004.
E-References	
1	https://www.docsity.com/en/classification-of-crude-drugs/2147112/
2	https://link.springer.com/content/pdf/10.1007%2F978-3-319-63862-1.pdf

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	**B.Sc**	Programme Code	**UCH**			Regulations	**2018-2019**	
Department	**Chemistry**		Semester				**3**	
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L		P	C	CA	ESE	Total
18U3CHN03	**Water Quality Analysis**		3		0	2	25	75	100
COURSE OBJECTIVES	1.To study the characteristics ofwater 2.To learn the importance of water purification 3.To analyse thequality measurement aboutwater							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme ofstudy.							
PO 2	Ability to express thoughts and ideas effectively in writingand orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,							
PO 3	Capability to apply analytic thought to a body of knowledge;analyse and evaluate evidence,arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,							
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.							
PO 5	Ability to evaluate the reliability and relevance of evidence;identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusionsetc.,							
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group,and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations,demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.							
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.							

PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,

COs	**COURSE OUTCOME**
CO 1	Students knew the various sources of water.
CO 2	Students able to understand the importance of various water quality parameters.
CO 3	Students able to determine the hardness of water.
CO 4	Students knowledge on sources, analysis and control methods of industrial waste water .
CO 5	Students learn how to treat polluted water.
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**KLs**	**POs**	**KLs**
CO 1	2	PO 1	2
		PO 2	1
CO 2	2		
		PO 3	5
CO 3	5	PO 4	5
		PO 5	4
CO 4	3	PO 6	6
		PO 7	2
CO 5	4		
		PO 8	4
PSOs	**KLs**	PO 9	1
		PO 10	3
PSO 1	3		
		PO 11	3
		PO 12	2
PSO 2	4		
		PO 13	1
PSO 3	1	PO 14	6
		PO 15	3

CO / PO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	**PROGRAMME OUTCOME (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1
CO4	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3
CO5	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2

CO / PSO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					
COs	Programme Specific Outcome (**POs**)				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	2	1	3	2
PSO2	1	1	2	2	3
PSO3	2	2	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II &Model 2. Assignment 3. End SemesterExaminations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Introduction to Hydrology**	Periods	6
	World water resource; water resources of India- Different ecosysytem of hydrology- Riverine, Estuarine and marine-Status of water quality in India.		
Unit - II	**Characteristics of Water**	Periods	6
	Water quality parameters and their interaction-physical and chemical characteristics- colour, odour, taste, turbidity, temperature-chemical constituents- electrical conductivity - suspended solids - dissolved solids - acidity - total acidity - alkalinity - pH - free CO2 - dissolved O2 - free chlorine - chlorine demand.		
	Water Treatment	Periods	6

Unit - III	Water composition analysis - Hardness of water- Type of Hardness-Determination of hardness by EDTA method, Removal of hardness-Zeolite process, demineralization and Reverse osmosis - Salinity - ionic comPosition - Minerals-pollutants- BOD, COD- Water quality standard - ISI, EPA, WHO.		
Unit - IV	**Industrial Water Pollution, Its Control & Analysis**	Periods	6
	Sources of water pollution - domestic - industrial - agricultural - soil and radioactive wastes as sources of pollution. Water pollutants and their effects. Heavy metal pollution-public health significance of Cadmium - Chromium - Copper - Lead - Zinc - Manganese. Prevention and control its measures.		
Unit - V	**Industrial Waste Water Treatment**	Periods	6
	Aerobic treatment; Suspended growth aerobic treatment processes; Activated sludge process and its modifications; Attached growth aerobic processes; Tricking filters and Rotating biological contactors; Anaerobic treatment; suspended growth, attached growth, fluidized bed and sludge blanket systems; nitrification, denitrification; Phosphorus removal.		
Total Periods			**30**

Text Books	
1	B. K. Sharma, Industrial Chemistry; 8th Ed., Goel Publishing House, New Delhi, 1997.
2	B.K. Sharma and H. Kaur, "Environmental chemistry", Goel Publishing House, Meerut, 2008
3	Industrial chemistry by B.N.Chakrabarty, Oxford and IBH publishing Co, NewDelhi, 1981.
4	Industrial chemistry by B.K.Sharma, Goel Publishing House, Meerut.
References	
1	Chemical Process Industries Norrish Shreve, R. and Joseph A. Brink Jr. McGraw Hill, Industrial Book Company, London.
2	Production and Properties of Industrial Chemicals " Brain A.C.S. Reinhold" NewYork.
3	Outlines of Chemical Technology " For the 21st Century M. Gopala Rao & Matshall Sittig (3rd Edition)
4	College Industrial chemistry by P.P.Singhn, T.M.Joseph, R.G.Dhanvale, Himalaya Publishing house, Bombay 4th edition, 1983.
5	Applied chemistry by Jayashree Ghosh, S.Chand Publication Reprint 2013
E-References	
1	https://www.cdc.gov/healthywater/drinking/public/water_treatment.html
2	https://www.hunterwater.com.au

Signature of BOS Chairman

QP CODE-18U3CHC03

VIVEKANANDHA COLLEGE OF ARTS & SCIENCES FOR WOMEN
(AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
B.Sc. DEGREE EXAMINATION
III-SEMESTER
MODEL QUESTION- GENERAL CHEMISTRY – III

Time: 3 Hrs. Max.Marks : 75

Section A
Answer all questions (20 x 1 = 20)

1	Which of the following has d^5 configuration?				K1	CO-1
	A	Fe	B	Cr		
	C	Sc	D	Ti		
2	In d-block elements, the last electronentersinto---------- orbital				K2	CO-1
	A	s	B	p		
	C	d	D	f		
3	Which of the following is a diamagnetic ion?				K2	CO-1
	A	Co^{2+}	B	Cu^{2+}		
	C	Mn^{2+}	D	Sc^{3+}		
4	Zn does not show variable valency because of				K2	CO-1
	A	complete d sub shell	B	inert pair effect		
	C	$4s^2$ sub shell	D	none of these		
5	Which has the reducing property?				K2	CO-2
	A	O_3	B	OsO_4		
	C	$LiAlH_4$	D	HNO_3		
6	In hydrides, the oxidation state of hydrogen is				K1	CO-2
	A	1	B	0		
	C	-1	D	-2		
7	Diborane contains				K1	CO-2

	A	3c-2e bond	B	2c-2e bond		
	C	3c-3e bond	D	none of these		
8	Alkenes can be reduced by				K1	CO-2
	A	O_3	B	$NaBH_4$		
	C	$LiAlH_4$	D	HNO_3		
9	Which of the following is acidic in nature?				K1	CO-3
	A	CH_3OH	B	C_6H_5OH		
	C	CH_4	D	HCHO		
10	Which of the following not obeys Huckel's rule?				K1	CO-3
	A	benzene	B	naphthalene		
	C	acetic acid	D	cyclopentadienyl anion		
11	The reaction between phenol and bromine in the formation of white precipitate. It is due to				K1	CO-3
	A	2-bromophenol	B	4-bromophenol		
	C	2,4,6-tribromophenol	D	None of these		
12	Which of the following give alkenes on oxidation?				K1	CO-3
	A	CH_3OH	B	CH_3CH_2OH		
	C	$(CH_3)_2CHOH$	D	$(CH_3)_3COH$		
13	The oxidation of primary alcohol gives				K1	CO-4
	A	aldehyde	B	ketone		
	C	both a & b	D	none		
14	The carbonyl carbon is				K1	CO-4
	A	electrophilic	B	nucleophilic		
	C	non polar	D	none		
15	Which of the following does not give positive test for haloform reaction?				K1	CO-4
	A	acetaldehyde	B	acetone		
	C	2-butanone	D	3-hexanone		
16	A strong base can abstract an α-hydrogen from				K1	CO-4

	A	amine	B	alkane		
	C	alkene	D	ketone		
17	Which of the following is true for a closed system?				K1	CO-5
	A	mass entering = mass leaving	B	mass does not enter or leave the system		
	C	mass entering can be more or less than the mass leaving	D	none of the mentioned		
18	The processes or systems that do not involve heat are called				K1	CO-5
	A	isothermal processes	B	equilibrium processes		
	C	thermal processes	D	adiabatic processes		
19	The -------- law of thermodynamics states that energy can neither becreated nor destroyed				K1	CO-5
	A	I	B	II		
	C	III	D	ZERO		
20	Heat andwork are---------- functions				K1	CO-5
	A	state	B	path		
	C	point	D	none		
	Section B **Answer All questions (5 x 5 = 25)**					
21	A	Why d-block elements possess variable oxidation state?			K2	CO-1
		OR				
	B	Write the preparation, properties and uses of sodium nitroprusside,			K1	CO-1
22	A	Explain the prepartion, properties of NaH.			K2	CO-2
		OR				
	B	List out the synthetic uses of $LiAlH_4$.			K3	CO-2
23	A	State and explain Huckel's rule			K3	CO-3
		OR				
	B	State and explain Huckel's rule			K1	CO-3
24	A	How do you convert acetaldehyde into 2-hydroxy butanol?			K2	CO-4
		OR				
	B	Explain the mechanism of Reformatsky reaction.			K2	CO-4

25	A	Write a brief note on Joule-Thomson effect.	K1	CO-5
		OR		
	B	State and explain zeroth law of thermodynamics.	K2	CO-5
Section C Answer ANY THREE Questions (3 x 10 = 30)				
26		Explain in detail about the extraction of platinum.	K4	CO-1
27		Describe the structure of diborane.	K3	CO-2
28		What are the differences between 1˚, 2˚ & 3˚ alcohols?	K3	CO-3
29		Discuss in detail about the chemistry of acetone.	K3	CO-4
30		Derive the expression for work done in isothermal compression and adiabatic expansion.	K4	CO-5

TABLE OF SPECIFICATIONS (Question wise – No. of questions)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	2	4	-	1	-	-	7
II	3	2	2	-	-	-	7
III	5	-	2	-	-	-	7
IV	4	2	1	-	-	-	7
V	5	1	-	1	-	-	7
Total	19	10	5	2	-	-	35

TABLE OF SPECIFICATIONS (Marks wise – Total marks)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	6	8	-	10	-	-	24
II	3	6	15	-	-	-	24
III	9	-	15	-	-	-	24
IV	4	10	10	-	-	-	24
V	9	5	-	10	-	-	24
Total	31	29	40	20	-	-	120

QP CODE-18U3CHA01

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

DEPARTMENT OF CHEMISTRY

B.Sc., DEGREE EXAMINATION

MODEL QUESTION- ALLIED CHEMISTRY – I (BOTANY/ZOOLOGY)

Time: 3 Hrs. Max.Marks:75

Section A

Answer all questions (20 x 1 = 20)

1	Which of the following is example for ionicbond.?				K1	CO-1
	A	NaCl	B	Cl_2		
	C	F_2	D	KCl		
2	NaClcrystalhasa.....structure.				K1	CO-1
	A	Tetrahedral	B	Trigonal		
	C	Octahedral	D	hexagonal		
3	Covalentbondinvolves_____ofelectrons				K1	CO-1
	A	Sharing	B	Transfering		
	C	Both	D	None		
4	What is the bond order for O2molecule?				K3	CO-1
	A	1	B	2		
	C	0	D	3		
5	Which one of the following is aromaticcompound?				K2	CO-2
	A	Benzene	B	Alkene		
	C	Acetylene	D	chlorine		
6	pH of an alkaline water will be.....				K2	CO-2
	A	Zero	B	Low		
	C	High	D	None		
7	----------refers to the capability of water to neutralize abase.				K3	CO-2
	A	Acidity	B	Alkalinity		
	C	RO	D	Zeolite		
8	Hardness of water is due to the presenceof____				K2	CO-2
	A	Calcium	B	Ammonium		

	C	Magnesnium	D	Sodium		
9	Give an example for primary standardsolution				K2	CO-3
	A	oxalicacid	B	NaOH		
	C	KMnO4	D	Na2S2O3		
10	Oxalic acid Vs NaOH isanexamplefor_____titration				K2	CO-3
	A	Acidbase	B	Redox		
	C	Conductometric	D	Complexometric		
11	Number of Gram Equivalence per litre of solution is termedas------				K2	CO-3
	A	Molefraction	B	Molality		
	C	Normality	D	Molarity		
12	The solution whosestrengthisknownas solution				K4	CO-3
	A	Primary	B	Secondary		
	C	Both	D	none		
13	The structural unit which is responsible for activity of drug is termed as------				K1	CO-4
	A	Pharmacopore	B	Pharmacokinetics		
	C	Pharmacology	D	Pharma		
14	_____is used to killmicroorganism				K1	CO-4
	A	Antibiotics	B	antipyrectic		
	C	analgesics	D	none		
15	Sulphadrugscontains----------group				K2	CO-4
	A	Sulphonyl	B	amine		
	C	Acid	D	aldehyde		
16	The firstisolatedantibioticiscalled ----------.				K2	CO-4
	A	Penicillin	B	chlorophenicol		
	C	Tetraxylene	D	sulphathiazole		
17	Give an example for nitrogenousfertilizer..				K2	CO-5
	A	Urea	B	KCN		
	C	K_2SO_4	D	none		
18	_____isasubstancethatistoxictoplantsusedtodestroyunwantedvegetation.				K1	CO-5
	A	Herbicides	B	Fungicides		
	C	Rodenticide	D	all		
19	soil contain adequate amount of potash, lime and phosphoricacid.				K2	CO-5
	A	Alluvial soil	B	black soil		

	C	red soil	D	all		
20	DDT stands for----------				K3	CO-5
	A	Dichlorodiphenyltrichloroethane	B	Dichlorodiphenyltrichloromethane		
	C	Dichlorodiphenylethane	D	Dichloromethyltrichloroethane		
	Section B **Answer All questions (5 x 5 = 25)**					
21	A	Explain the characteristics ofionicbond			K4	CO-1
		OR				
	B	Draw the structure of NaCl and explain its nature of bonding.			K3	CO-1
22	A	Explain Arrhenius concept of acidandbases.			K2	CO-2
		OR				
	B	Write short note on conjugate acid and bases.			K4	CO-2
23	A	Define the following terms i)Molarityii)Normality			K1	CO-3
		OR				
	B	Write short notes on standard solution and explain its types.			K4	CO-3
24	A	Write the preparation for sulphaguanine and sulphathiazole			K3	CO-4
		OR				
	B	Give an brief account on antibiotics.			K2	CO-4
25	A	Describe the different types of soils			K1	CO-5
		OR				
	B	Explain the classification of nitrogeneous fertiliser with examples.			K1	CO-5
	Section C **Answer ANY THREE Questions (3x 10 = 30)**					
26		Explain the formation of covalent bond with twoexamples			K3	CO-1
27		Explain the classification of acid and bases withexamples.			K1	CO-2
28		Give an account on Acid –base and redoxtitration.			K3	CO-3
29		Explain the mechanism and mode of action of sulphadrugs.?			K1	CO-4
30		Explain the classification of pesticides.			K2	CO-5

TABLE OF SPECIFICATIONS (Question wise – No. of questions)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	3	0	3	1	0	0	7
II	1	4	1	1	0	0	7
III	1	3	1	2	0	0	7
IV	3	3	1	0	0	0	7
V	3	3	1	0	0	0	7
Total	20	10	2	2	1	0	35

TABLE OF SPECIFICATIONS (Marks wise – Total marks)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	3	0	16	5	0	0	24
II	10	8	1	5	0	0	24
III	5	3	10	6	0	0	24
IV	12	7	5	0	0	0	24
V	11	12	1	0	0	0	24
Total	41	30	33	16	0	0	120

QP CODE-18U3CHA03

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
B.Sc., DEGREE EXAMINATION
MODEL QUESTION- ALLIED CHEMISTRY – I (PHYSICS)

Time: 3 Hrs. Max.Marks : 75

Section A
Answer all questions (20 x 1 = 20)

1	Bond order of He_2 is				K-2	CO-1
	A	0	B	1		
	C	2	D	3		
2	Which of the following has linear shape?				K-4	CO-1
	A	H_2O	B	NH_3		
	C	CH_4	D	ICl		
3	Which one of the following is paramagnetic?				K-2	CO-1
	A	N_2	B	NO		
	C	CO	D	O_3		
4	Addition overlap of atomicorbitalsproduce---------- molecular orbitals.				K-1	CO-1
	A	antibonding	B	non bonding		
	C	bonding	D	none		
5	Which of the following has sp^2hybridisation?				K-2	CO-2
	A	C_2H_4	B	C_2H_6		
	C	C_2H_2	D	CH_4		
6	An alkyl halide can be converted into alkene by				K-2	CO-2
	A	substitution	B	addition		
	C	elimination	D	hydrogenation		
7	Which of the following does not obey Huckel's rule?.				K-4	CO-2
	A	benzene	B	naphthalene		
	C	cyclobutadiene	D	anthracene		
8	The electrophile involved in nitration reaction is				K-2	CO-2
	A	NO^+	B	NO_2^+		
	C	NO^-	D	NO_2^-		

9	Electrolytic conduction is due to migration of				K-1	CO-3
	A	protons	B	electrons		
	C	ions	D	atoms		
10	The unit of equivalent conductance is				K-5	CO-3
	A	$ohm^{-1}cm^2$	B	ohm cm		
	C	ohm cm^2	D	none		
11	Example for an acidic buffer				K-1	CO-3
	A	CH_3COOH/CH_3COONa	B	NH_4OH/NH_4Cl		
	C	NH_3/NH_4NO_3	D	N_2H_4/N_2H_5Br		
12	What is pH+pOH =?				K-1	CO-3
	A	4	B	12		
	C	14	D	6		
13	The medicine that inhibits the growth of or destroys microorganisms are called				K-2	CO-4
	A	antibiotics	B	antipyretics		
	C	anaesthetics	D	antihistamines		
14	Which of the following is not a braod spectrum antibiotics?				K-1	CO-4
	A	chloramphenicol	B	tetracyline		
	C	pencillin	D	erythromycin		
15	The drug used to treat bacillary dysentery is				K-5	CO-4
	A	sulfapyridine	B	sulfaguanidine		
	C	sulfathaizole	D	none		
16	Sulfa drugs contain				K-2	CO-4
	A	sulphonamide group	B	sulfide group		
	C	sulphate group	D	sulphite group		
17	Which of the following is an example of corrosion?				K-5	CO-5
	A	Rusting of iron	B	Tarnishing of silver		
	C	Liquefaction of ammonia	D	Rusting of iron and tarnishing of silver		
18	Spray painting is used to:				K-4	CO-5
	A	Apply paint without touching surface	B	Apply large amount of paint		
	C	Reach high areas	D	Get textured paint		

19	The pigments in paints is mixed to give desired				K-2	CO-5
	A	smoothness	B	colour		
	C	appearance	D	all the above		
20	The liquid medium uesd in oil paints is				K-1	CO-5
	A	thinner	B	alcohol		
	C	linseed oil	D	turpentine		
	Section B **Answer ANY ONE Question (5 x 5 = 25)**					
21	A	Explain preparation, properties & uses of IF_5			K-1,.	CO-1
		(OR)				
	B	What are the differences between bonding & antibonding orbital?			K-4	CO-1
22	A	Write a note on hybridization of methane			K-2	CO-2
		(OR)				
	B	Explain the mechanism of nitration in Benzene			K-1	CO-2
23	A	(i) Explain common ion effect withexamples. (ii) Define Ph.			K-2	CO-3
		(OR)				
	B	Describe Kohlrausch's law and its application			K-2	CO-3
24	A	(i) Write a note on properties & uses ofpencillin. (ii) Write a note on preparation & properties ofsulphathiazole.			K-1	CO-4
		(OR)				
	B	(i) Describe the types ofantibiotics. (ii) Write a note on properties, uses ofsulphaguanidine			K-5	CO-4
25	A	Describe the types of corrosion and prevention of corrosion.			K-3	CO-5
		(OR)				
	B	(i) What are the requirements of a goodpaint? (ii) How do you prepareVarnishes?			K-2	CO-5
	Section C **Answer ANY ONE Question (3 x 10 = 30)**					
26	Draw MO diagram for carbon monoxide & F_2 .				K-1	CO-1
27	What is meant by aromaticity? Explain the mechanism for Halogenation &Friedal-Craft alkylation ofbenzene				K-2	CO-2
28	Explain conductometric titration and its types in detail.				K-4	CO-3

29	Explain the structure, properties and uses of Erythromycin.	K-5	CO-4
30	Explain (i) Paints (ii) Thinner (iii) Binder (iv) Pigments	K-3	CO-5

TABLE OF SPECIFICATIONS (Question wise – No. of questions)

Outcome/Unit	K1 (Remembering	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	03	02	-	02	-	-	07
II	01	05	-	01	-	-	07
III	02	02	-	01	01	-	06
IV	02	02	-	-	03	-	07
V	01	02	02	02	01	-	08
Total	09	13	02	06	05	-	35

TABLE OF SPECIFICATIONS (Marks wise – Total marks)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	16	2	-	5	-	-	23
II	4	20	-		-	-	24
III	5	10	-	10	-	-	25
IV	4	10	-	-	10	-	24
V	4	10	10	-	-	-	24
Total	33	52	10	15	10	-	120

QP CODE-18U3CHN01

VIVEKANANDHA COLLEGE OF ARTS & SCIENCES FOR WOMEN
(AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
B.Sc., DEGREE EXAMINATION - IV
SEMESTER MODEL QUESTION-
INDUSTRIAL CHEMISTRY – I

Time: 3 Hrs. Max.Marks : 75

Section A
Answer all questions (75 x 1 = 75)

1	Colour of water is meseaured by an instrument called……				K1	CO-1
	A	Centrifugation	B	Tintometer		
	C	pH meter	D	Electrometer		
2	For the municipal water supply the turbidity of water should not exceed… ..... level				K2	CO-1
	A	15ppm	B	10ppm		
	C	25ppm	D	35ppm		
3	The teeth of children appears discolored due to the presence of …….				K2	CO-1
	A	Fluorides	B	Chlorides		
	C	Hardness	D	All of these		
4	……. Solution is used to record the analysis the chlorine content in water.				K4	CO-1
	A	Ortho toluidine	B	Meta toluidine		
	C	Para toluidine	D	None		
5	BOD means ……..				K3	CO-1
	A	Basic oxygen demand	B	Biological oxygen demand		
	C	Bacterial oxygen demand	D	Bio oxygen demand		
6	Which of the following causes alkalinity and hardness in natural water?				K2	CO-1
	A	$CaCO_3$	B	$Ca(HCO_3)_2$		
	C	$MgCO_3$	D	All of these		
7	What is the pH of pure water?				K1	CO-1
	A	7	B	Less than 7		
	C	Greater than 7	D	Zero		
8	Acidity in water is mainly due to presence of …….				K2	CO-1

	A	$CuSO_4$	B	$CaCO_3$		
	C	Na_2CO_3	D	NH_4OH		
9	Hardness of water is due to the presence of salts of ……..				K1	CO-1
	A	Potassium	B	Chlorine		
	C	Magnesium	D	Boron		
10	Select the incorrect statement from the following :				K4	CO-1
	A	Water which does not form lather with soap and forms white scum is called hard water	B	Hard water contains dissolved calcium and magnesium salts in it		
	C	In hard water, cleansing quality of soap is depressed	D	Due to the presence of dissolved hardness-producing salts, the boiling point of water is depressed		
11	Select the incorrect statement from the following option.				K5	CO-1
	A	Permanent hardness is due to dissolved chlorides and sulphates of calcium and magnesium	B	It can be removed by mere boiling of water		
	C	It is also known as non-alkaline hardness	D	The difference between the total hardness and the alkaline hardness gives the non-alkaline hardness		
12	Alkaline hardness is due to the presence of bicarbonate, carbonate and hydroxides of the hardness-producing metal ions				K4	CO1
	A	True	B	False		
13	Select the incorrect statement from the following :				K5	CO1
	A	The taste of hard water is better than soft water	B	The dissolved calcium in hard water can help to produce strong teeth		
	C	Hard water coats the lead piping with a layer of insoluble calcium carbonate which prevents poisonous lead dissolving in water	D	Boiler feed water should also be hard in nature		
14	Hardness of water is conventionally expressed in terms of equivalent amount of ……				K3	CO1
	A	H_2CO_3	B	$MgCO_3$		
	C	$CaCO_3$	D	$Na_2 CO_3$		
15	Which of the following is not a unit of hardness?				K1	CO1
	A	Parts per million	B	Degree centigrade		
	C	Degree clarke	D	Degree French		

16	…….. is used for the salting out of soap.				K3	CO2
	A	NaOH	B	$CuSO_4$		
	C	NaCl	D	$BaCl_2$		
17	Which one the following is acting as the perfumery agent during the manufacture of soap?				K1	CO2
	A	Jasmine Oil	B	Castor Oil		
	C	Grease Oil	D	None		
18	Which type of soap is useful for sensitive skin for allergies?				K3	CO2
	A	Toilet soap	B	Metal soap		
	C	Transparent soap	D	Detergents		
19	What is true about soap?				K5	CO2
	A	Soaps are water soluble	B	Soaps are made from fats and Oils		
	C	Soaps are formed from sodium (or) potassium salts of fatty acids	D	All of these		
20	Which of the following the residual product in the formation of soap?				K2	CO2
	A	Glyceraldehydes	B	Glycerol		
	C	Glycerin	D	Acrylonitrile		
21	Which soaps are used in making shaving cream and shampoos?				K1	CO2
	A	Calcium	B	Potassium		
	C	Sodium	D	Magnesium		
22	Detergents are sodium salts of ……..				K2	CO2
	A	Aryl benzene sulphonic acid		Sulphonic acid		
	C	Alkyl benzene sulphonic acid	D	Glycerin Oil		
23	Which one of the following is acting as common toilet soap?				K1	CO2
	A	Potassium hydroxide		Sodium Carboxylate		
	C	Potassium Carboxylate		Glycerin		
24	Soft soaps are the limitation of hot process because of their ……				K4	CO2
	A	High alkalinity		Low alkalinity		
	C	Low solubility in water		High solubility in water		
25	Soaps do not act efficiently in hard water and in acidic solution.				K3	CO2
	A	True		False		
26	Soaps are..... based soapydetergents				K2	CO2
	A	Water	B	Kerosene		

	C	Oil	D	Acid		
27	The saponification of a fat or oil isdone using.....solution forhot process				K1	CO2
	A	KOH	B	NaOH		
	C	HCl	D	NaCl		
28	Select the incorrect statement from the following option.				K4	CO2
	A	Hard soaps are the sodium carboxylates	B	Soft soaps are potassium carboxylates		
	C	Hard soaps are manufactured by cold process	D	Example of soft soap – shampoo and shaving cream		
29	Which of the following is a typical soap molecule?				K1	CO2
	A	Calcium stearate	B	Potassium permanganate		
	C	Sodium bicarbonate	D	Sodium stearate		
30	The % weight of detergent in washing powders is ……..				K1	CO2
	A	5 – 10	B	50 – 70		
	C	15 – 30	D	30 – 45		
31	…….. glass is used for making lenses.				K1	CO3
	A	Silicate glass	B	Borosilicate glass		
	C	Optical glass	D	Flint glass		
32	The main constituent of Borosilicate glass is ……..				K2	CO3
	A	Silica and borax	B	Alumina		
	C	Quartz	D	Sand		
33	How does the addition of magnesia and alumina affect the glass?				K3	CO3
	A	Reduces porosity	B	Enhances mechanical strength		
	C	Increase softening temperature	D	Improves chemical durability		
34	Which of the following is not a process involved in glass production?				K2	CO3
	A	Foaming and shaping	B	Annealing		
	C	Boiling	D	Finishing		
35	Which one is an example for amorphous solid?				K1	CO3
	A	NaCl	B	Glass		
	C	CsCl	D	Rutile		
36	For the manufacture of soft glass, which one of the following is act as a raw material?				K1	CO3
	A	K_2CO_3	B	Na_2CO_3		

	C	SiO_2	D	Al_2O_3		
37	Glasses have good ……..				K2	CO3
	A	Tensile strength	B	Mechanical property		
	C	Compressive strength	D	All the above		
38	Hard glasses is also called as ……..				K1	CO3
	A	Soda lime	B	Potash lime		
	C	Lead glass	D	Crooke glass		
39	Which method of forming cannot be used to produce sheet glass?				K3	CO3
	A	Floating	B	Rolling		
	C	Drawing	D	Casting		
40	Glasses showevidenceof..... fractures				K2	CO3
	A	No	B	Brittle		
	C	Ductile	D	Oblique		
41	Glass is a mixture of …….				K2	CO3
	A	Non metallic Silicates	B	Metallic silicates		
	C	Metallic acetates	D	Non-metallic acetates		
42	What changes are observed when a glass is heated?				K4	CO3
	A	It becomes softer	B	It bursts		
	C	It solidifies	D	It disintegrates		
43	How many commercial forms of glass are there for various engineering and industrial requirements?				K2	CO3
	A	8	B	11		
	C	9	D	10		
44	What material is used in greenhouse?				K2	CO3
	A	Corrugated thermoplastic	B	Polycarbonate		
	C	GI sheet	D	Laminated tempered glass		
45	Primary components of glass				K1	CO3
	A	Crystal	B	Sand		
	C	Silica	D	Limestone		
46	Which are commonly used as liquid lubricants?				K1	CO4
	A	Animal Oils	B	Vegetable Oils		
	C	Mineral Oils	D	Blended Oils		
47	The temperature at which the impurities begin to separate from the solution and lubricating oil becomes hazy in appearance is called ……				K2	CO4

	A	Flash point	B	Cloud point		
	C	Pour point	D	Fire point		
48	Example for water in oil emulsion (W/O) is ……				K2	CO4
	A	Vanishing cream	B	Butter		
	C	Paraffin oil	D	Lubricating oil		
49	An allotrope of carbon is ……				K1	CO4
	A	Molybdenum sulphide	B	Emulsion		
	C	Graphite	D	Grease		
50	Lubricants are used to reduce …….				K3	CO4
	A	smoothness	B	friction		
	C	resistance	D	efficiency		
51	Example for oil in water emulsion (O/W) is …….				K2	CO4
	A	Vanishing cream	B	Castor oil		
	C	Cod liver oil	D	Butter		
52	The temperature below which the liquid loses its flow nature is ……				K1	CO4
	A	Cloud point	B	Viscosity index		
	C	Pour point	D	Critical point		
53	Lubrication is necessary to protect wear and tear caused due to ….				K2	CO4
	A	Electrostatic force	B	Gravitational force		
	C	Frictional force	D	Magnetic force		
54	Select the incorrect statement from the following option				K4	CO4
	A	Lubricant keeps out dirt	B	Lubricant act as a seal		
	C	Lubricant transmit fluid power	D	Lubricant enhance corrosion		
55	On increasing the lubrication, the efficiency of the machine ……..				K2	CO4
	A	Increases	B	Decreases		
	C	Remains same	D	Does not get affected		
56	For heavy cutting, the effective lubricants are …….				K2	CO4
	A	Coconut Oil	B	Cutting Oil		
	C	Kerosene	D	Diesel		
57	Oil emulsions are the most effective lubricants in				K1	CO4
	A	Heavy cutting	B	Light cutting		
	C	Engines	D	Gears		
58	The lubricant undergoes internal combustion when exposed to ……				K5	CO4

	A	High pressure	B	Low pressure		
	C	Low temperature	D	High temperature		
59	What is the best lubricant for tractor roller?				K1	CO4
	A	Graphite	B	Heavy Oil		
	C	Grease	D	Vegetable Oil		
60	What are the lubricants used for railway tracks?				K3	CO4
	A	Graphite	B	Grease		
	C	Coconut Oil	D	Vegetable Oil		
61	To improve anti knockofengine ..... areadded				K2	CO5
	A	Tetraethyl Lead	B	n - decane		
	C	Diethyl telluride	D	n - hexane		
62	Bergius process is used to produce ……				K4	CO5
	A	Crude oil	B	Solid coal		
	C	Synthetic petrol	D	Alcohol		
63	When leaded petrol is used as a fuel, the TEL is converted to…….				K1	CO5
	A	Magnesium oxide	B	Lead oxide		
	C	Lead hydroxide	D	Zinc oxide		
64	In a petrol engine, fuel used as a mixture of…….....and .....at 1 :17 ratio.				K1	CO5
	A	Gasoline and air	B	Heavy oil and air		
	C	Naphthalene and air	D	Benzene and air		
65	Octane number is a rating of ……				K2	CO5
	A	Petrol knocking	B	Diesel knocking		
	C	Petrol cracking	D	Diesel cracking		
66	Petrol containing TEL is called is …….				K1	CO5
	A	Crude oil	B	Leaded petrol		
	C	Gasoline	D	Diesel		
67	Water gas is a mixture of ……				K2	CO5
	A	$H_2O + CO_2$	B	$CO + H_2O$		
	C	$CO + H_2$	D	$CH_4 + H_2$		
68	Depositsof ..... are harmful to the vehicleengine.				K1	CO5
	A	MgO	B	CaO		
	C	PbO	D	ZnO		
69	What does the word petrochemicals signify?				K3	CO5

	A	Chemicals based on coal	B	Chemicals based on rocks		
	C	Chemicals based on atmospheric conditions	D	Chemicals based on fertility		
70	Which of the following raw material obtained from petroleum can be in preparation of acetic acid?				K1	CO5
	A	Acetone	B	Phosphoric acid		
	C	Ethylene	D	Tartaric acid		
71	Which of the following is a non-petroleum source?				K1	CO5
	A	CaC_2	B	H_2S		
	C	Paraffin	D	Olefin		
72	The main aim of cracking is to produce ……..				K2	CO5
	A	Gasoline	B	Lube Oil		
	C	Coke	D	Salt		
73	Which of the following is desirable in petrol (gasoline) but undesirable in kerosene?				K4	CO5
	A	Paraffins	B	Aromatics		
	C	Mercaptans	D	Napthenic acid		
74	Molecular weight of crude petroleum may be around ……				K2	CO5
	A	50	B	250		
	C	1500	D	5000		
75	Petroleum deposits are detected by ……..				K2	CO5
	A	Oil seepage at the surface of the earth	B	Measurement of density, elasticity, magnetic and electric properties of the rock in the crust of the earth		
	C	Age and nature of rocks inside the crust of the earth	D	All the above		

TABLE OF SPECIFICATIONS (Question wise – No. of questions)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	4	4	2	3	2	-	15
II	6	3	3	2	1	-	15
III	5	7	2	1	-	-	15
IV	5	6	2	1	1	-	15
V	6	6	1	2	-	-	15
Total	26	26	10	9	4	-	75

TABLE OF SPECIFICATIONS (Marks wise – Total marks)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	4	4	2	3	2	-	15
II	6	3	3	2	1	-	15
III	5	7	2	1	-	-	15
IV	5	6	2	1	1	-	15
V	6	6	1	2	-	-	15
Total	26	26	10	9	4	-	75

QP CODE-18U3CHN02

`VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES COLLEGE FOR WOMEN

(Autonomous)

DEPARTMENT OF CHEMISTRY

MODEL EXAMINATION

Programme(s)	Title of the Paper	Semester
B.Sc. CHEMISTRY	**NMEC- MEDICINAL CHEMISTRY**	IV

Time: 3 Hrs. Max.Marks : 75

Section A

Answer all questions (75 x 1 = 10)

1	Is known as father of medicine?				K1	CO-1
	A	Aristotle	B	Dioscorides		
	C	Hippocrates	D	Galen		
2	The ayurvedic classification system of physiological components of human beings,vaata,pitha kaba is also followed in				K2	CO-1
	A	Naturopathy	B	Yoga		
	C	Unani	D	Siddha		
3	The National Institute of Ayurveda NIA is the apex institute for training and research in Ayurveda in india.where is it located ?				K1	CO-1
	A	Bangalore	B	Chennai		
	C	Jaipur	D	Kolkatta		
4	The Unani Systems of medicine is based on the teachings of				K1	CO-1
	A	Galileo	B	Theodotus		
	C	Hippocrates	D	Herophilo		
5	*Who is father of Pharmacognosy?*				K1	CO-1
	A	Theophrast seydler	B	Elder		
	C	Hippocrates	D	None of these		
6	Where is the central research institute of unani medicine situated.				K1	CO-1
	A	Bangalore	B	New delhi		
	C	Kolkata	D	Hyderabed		
7	Who is the author of the book " Lectures on homeopathic philosophy.				K1	CO-1

	A	J.K. Kent	B	Hahnemann		
	C	J.H Clarke	D	Nash		
8	In Great Britain homeopathy is more commonly called				K2	CO-1
	A	homoeopathy	B	homeopathy		
	C	homopathy	D	similiopathy		
9	Homeopathy was a type of therapy developed by ----------				K1	CO-1
	A	Samuel Hahnemann	B	Hippocrates		
	C	Galelio	D	Aristotle		
10	---------- is the scope of *Pharmacognosy*				K2	CO-1
	A	New drug discovery	B	Cinchona		
	C	Both a and b	D	None of the above		
11	Who is traditionally regarded as the founder ofAyurveda?				K1	CO-1
	A	Shri lakshmi	B	Kamadhenu		
	C	Dhanvantari	D	Airavata		
12	Aurveda medicine includes most of the following,except				K2	CO-1
	A	Herbs	B	Diet Modifications		
	C	Life style changes	D	Needles		
13	Unani is close to the				K1	CO-1
	A	Ayurveda	B	Siddha		
	C	Homeopathy	D	Allopathy		
14	Who introduced the unani system of medicine to india?				K1	CO-1
	A	Chinese	B	Japanese		
	C	Portugues	D	Arabs		
15	Law of similia is under the principle of				K1	CO-1
	A	Homeopathy	B	Ayurveda		
	C	Siddha	D	Unani		
16	Which classification of crude drug arrange in alphabetical order				K2	CO-2
	A	Taxonomical	B	Alphabetical		
	C	Biological	D	Morpological		
17	Which classification does not describe organixed and unorganized crude drugs?				K2	CO-2
	A	Morphological	B	Taxonomical		
	C	Chemical	D	Alphabetical		
18	Cinchona contains				K1	CO-2

	A	Glycosides	B	Alkaloids		
	C	Both a and b	D	None of the above		
19	Which is definite in structure?				K2	CO-2
	A	Organized drug	B	Unorganized drug		
	C	Both a and b	D	None of the above		
20	Which is the main source of curde drugs?				K1	CO-2
	A	Plant	B	Animal		
	C	Mineral	D	Marine		
21	Who is the author of material medica pura?				K1	CO-2
	A	Nash	B	Kent		
	C	Hahnemann	D	Clarke		
22	In glycerrhiza glabra, glabra is belongs to				K2	CO-2
	A	Class	B	Order		
	C	Genus	D	Species		
23	Which of the following is used to sore throat.				K2	CO-2
	A	Ginger	B	Opium		
	C	Vasaka	D	Fennel		
24	Which chemical constituent contain in digitalis.				K3	CO-2
	A	Glycoside	B	Lipids		
	C	Resins	D	Vitamins		
25	Which chemotaxonomic classification is the relation between chemistry				K3	CO-2
	A	Morphology	B	Taxonomy		
	C	Biology	D	Pharmacology		
26	In which classification is easily to identify the crude durgs				K3	CO-2
	A	Alphabetical	B	Taxonomical		
	C	Morphological	D	Pharmacological		
27	Drug is not under the class of organized drug				K2	CO-2
	A	Leaves	B	Fruits		
	C	Flowers	D	Gums		
28	Drug is not an example of organized crude drug				K2	CO-2
	A	Digitalis	B	cinchona		
	C	Aloe	D	Clove		
29	Most of the members of solanaceae occurs from				K1	CO-2

	A	Tropane alkaloid	B	Opium alkaloid		
	C	Morphine	D	Codaine		
30	Give an example for alphabetical classification?				K1	CO-2
	A	Acacia	B	Benzoin		
	C	Cinchona	D	All of these		
31	What plant gel is often used in lotions and sunblocks?				K1	CO-3
	A	Aloe Vera	B	St.Johns Wort		
	C	Echinacea	D	Ginger		
32	What form of herbal medicine is widely practiced in India?				K1	CO-3
	A	Western	B	Greek		
	C	Chinese	D	Ayurvedic		
33	Herbal madicine that is applied externally wih a vegetable based fat is called what?				K2	CO-3
	A	Tincture		Infusion		
	C	Poultice		An Infusion		
34	The steeping of herbs in alcohol to extract its healing properties produces what?				K2	CO-3
	A	Tincture		Infusion		
	C	Poultice		An Infusion		
35	Which one is used to make hot infusion?				K1	CO-3
	A	Tea pot		Container		
	C	Bottles		None of the above		
36	Herbal medicine is based on the use of what?				K2	CO-3
	A	Plant and Plant extract		Water		
	C	Animal sacrifice		Human hair		
37	Infusion is otherwise known as				K1	CO-3
	A	Liquid		Resultant liquid		
	C	Solid		Semi-solid		
38	Herbal syrup is prepared from				K2	CO-3
	A	Honey		Salt		
	C	Benzene		None of the above		
39	What type of natural fabric is used for making surgical dressing?				K2	CO-3
	A	Wood cellulose		Nylon		
	C	Terylene		All of these		

40	----------is a thread used for stitching together muscles with the help on needles.				K1	CO-3
	A	Surgical suture		Bandages		
	C	Dressings		None of the above		
41	Which types under muscle fibre?				K2	CO-3
	A	Slow Oxidative		Fast Oxidative		
	C	Fast glycolytic		All of the above		
42	What is the main use of surgical bandage ?				K1	CO-3
	A	First aid		Operation theater		
	C	Both a and b		None of the above		
43	Lotion to treated as				K2	CO-3
	A	Dry skin		Moisture		
	C	Itching		All of these		
44	Herbal oil extract from---------				K2	CO-3
	A	Vegetables		Animals		
	C	Minerals		None of the above		
45	What is the most effective natural insect repellent?				K1	CO-3
	A	Ginger oil		Volatile oil		
	C	Tea oil		Eucalyptus oil		
46	Amla belongs to				K1	CO-4
	A	Phyllanthaceae		Solanaceae		
	C	Euphorbiaceae		Liliaceae		
47	Amla oil extract from				K1	CO-4
	A	Zingiber officinale		Phyllanthus emblica		
	C	Allium sativam		Hibiscus rosasinenis		
48	Amla contains				K1	CO-4
	A	Vitamin B		Vitamin B_{12}		
	C	Vitamin B_6		Vitamin C		
49	Amla is good for				K2	CO-4
	A	Liver		Heart		
	C	Hair growth		All of the above		
50	Ginger is commonly used as				K1	CO-4
	A	Nausea and vomiting		Diabetes and haed ache		
	C	Both a and b		A only		

51	The scientific name of Ginger is				K1	CO-4
	A	Phyllanthus emblica		Zingiber officinale		
	C	Allium sativam		Hibiscus rosasinenis		
52	Garlic is closely relates to				K1	CO-4
	A	Onion		Ginger		
	C	Tomato		Pepper		
53	Which is known as stimulant laxative?				K3	CO-4
	A	Castor oil		Ginger		
	C	Amla		Onion		
54	Which part is mainly used as medicine in cinchona?				K3	CO-4
	A	Leaves		Bark		
	C	Roots		All of the above		
55	The scientific name of neem is				K1	CO-4
	A	Phyllanthus emblica		Azadiracta Indica		
	C	Allium sativam		Hibiscus rosasinenis		
56	Neem belongs				K1	CO-4
	A	Meliaceae		Solanaceae		
	C	Euphorbiaceae		Liliaceae		
57	Which of the following as natural antibiotic?				K1	CO-4
	A	Cloves		Paracetomol		
	C	Aspirin		None of the above		
58	Eugenol oil is extract from				K1	CO-4
	A	Castor		Neem		
	C	Cloves		Garlic		
59	Cinchona belongs to				K1	CO-4
	A	Rubiaceae		Solanaceae		
	C	Euphorbiaceae		Liliaceae		
60	Azadiracta Indica,commonly known as				K1	CO-4
	A	Neem		Amla		
	C	Tulasi		Turmeric		
61	Deliberate adulteration is otherwise called				K1	CO-5
	A	Accidental adulteration		Intentional adulteration		
	C	Indeliberate adulteration		All of the above		

62	Which of the following leads to adulteration?				K1	CO-5
	A	High expensive		Scarcity of the drugs		
	C	Contraband drugs		All of the above		
63	The phytochemicals defense against				K2	CO-5
	A	Competitors		Pathogens		
	C	Predators		All of the above		
64	Which is the good source of phytochemicals?				K1	CO-5
	A	Apple		Broccoli		
	C	Carrot		All of the above		
65	Why stability testing of herbal product is necessary?				K2	CO-5
	A	Environmental factor		Prevent microbial contamination		
	C	Size of particles		All of the above		
66	Which chemicals produced by plants through primary or secondary metabolism				K1	CO-5
	A	Phytochemicals		Electrochemical		
	C	Photochemical		None of the above		
67	InDeliberate adulteration is otherwise called				K1	CO-5
	A	Accidental adulteration		Intentional adulteration		
	C	Deliberate adulteration		All of the above		
68	The undissolved portion of the drug that remains after extraction				K2	CO-5
	A	Solute		Marc		
	C	Solvent		Active drug		
69	Which of the following is not the class of secondary metabolite ?				K1	CO-5
	A	Amino acids		Terpenes		
	C	Alkaloids		Phenolics		
70	Which of the following sugars as metabolites?				K3	CO-5
	A	Fructose		Sucrose		
	C	Glucose		Both a and c		
71	Secondary metabolites serve used against				K1	CO-5
	A	Bacteria		Fungi		
	C	amoebae		All of he above		

72	Metabolic intermediates found in living systems which are essential for growth and life is called				K2	CO-5
	A	Saponins		Tannins		
	C	Secondary metabolite		Primary metabolite		
73	Which one is example for secondary metabolites in industry?				K1	CO-5
	A	Erythromycin		Bacitracin		
	C	Both a and b		None of the above		
74	Standardization of drug means				K1	CO-5
	A	Identity		Quality		
	C	Purity		All of these		
75	A local sorce of glycosides is				K1	CO-5
	A	Cyanogenum esculenta		manihot esculenta		
	C	manihot cympogon		) manihot esculentum		

TABLE OF SPECIFICATIONS (Question wise – No. of questions)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	11	4	-	-	-	-	15
II	5	7	3	-	-	-	15
III	7	8	-	-	-	-	15
IV	12	1	2	-	-	-	15
V	10	4	1	-	-	-	15
Total	45	24	6	-	-	-	75

TABLE OF SPECIFICATIONS (Marks wise – Total marks)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	11	4	-	-	-	-	15
II	5	7	3	-	-	-	15
III	7	8	-	-	-	-	15
IV	12	1	2	-	-	-	15
V	10	4	1	-	-	-	15
Total	45	24	6	-	-	-	75

QP CODE- 18U3CHN03

` VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES COLLEGE FOR WOMEN

(Autonomous)

DEPARTMENT OF CHEMISTRY

MODEL EXAMINATION (FEBRUARY- 2020)

Programme(s)	Title of the Paper	Semester
B.Sc. CHEMISTRY	**WATER QUALITY ANALYSIS**	III

Time: 3 Hrs. Max.Marks:75

Section A

Answer all questions (10 x 1 = 10)

1	The % of earth covered by oceans is about					K1	CO-1
	A	31%	B	51			
	C	71	D	97			
2	The percentage of total quantity of water in the world that is saline is about					K2	CO-1
	A	71%	B	33%			
	C	67%	D	97%			
3	A rainfall with an intensity of 5 mm/h is classified as					K2	CO-1
	A	traces	B	moderate rain			
	C	heavy rain	D	Lightrain			
4	Which is the odd one in the following?					K4	CO-1
	A	Snow	B	Sleet			
	C	Rain	D	Hail			
5	A plot between rainfall intensity versus time is called as					K3	CO-1
	A	hydrograph	B	mass curve			
	C	hyetograph	D	Isohyets			
6	The average pan coefficient for the standard US Weather Bureau class A pan is					K2	CO-1
	A	0.85	B	0.70			
	C	0.90	D	0.20			
7	The science and practice of water flow measurement is known as					K1	CO-1
	A	Hypsometry	B	Hydrometeorology			
	C	Fluvimetry	D	Hydrometry			

8	A hydrograph is a plot of				K2	CO-1
	A	rainfall intensity against time	B	stream discharge against time		
	C	cumulative rainfall against time	D	cumulative runoff against time		
9	A unit hydrograph has				K1	CO-1
	A	one unit of peak discharge	B	one unit of rainfall duration		
	C	one unit of direct runoff		one unit of the time base of direct runoff		
10	Which of the following equation is used in hydrological flood routing?				K4	CO-1
	A	energy equation	B	continuity equation		
	C	equation of motion	D	both a and c		
11	The diversion channels seen in the Western Himalayas are called				K5	CO-1
	A	Guls or Kuls	B	Khadins		
	C	Johads	D	Recharge pits		
12	The major source of fresh water in India is				K4	CO-1
	A	rainfall	B	ground water		
	C	atmospheric water	D	ocean water		
13	Rooftop rainwater harvesting is a technique to recharge				K5	CO-1
	A	river water		lake water		
	C	sea water		ground water		
14	How much of earth's surface is covered with water?				K3	CO-1
	A	One-fourth		Half		
	C	Three-fourth		Two-third		
15	How many oceans constitute the marineecosystems around peninsular India?				K1	CO-1
	A	1		2		
	C	3		4		
16	Which is the largest ecosystem on Earth?				K3	CO-2
	A	Desert		Forest		
	C	Grassland		Oceans		
17	Which of the following represents the physical characteristics of water?				K1	CO-2
	A	Chloride content		BOD		
	C	Turbidity		COD		
18	Which of the following is measured in mg/L?				K3	CO-2

	A	Unit weight		Coefficient of cohesion		
	C	Discharge		Turbidity		
19	Which of the following instrument is used to measure turbidity?				K5	CO-2
	A	Olfactometer		Turbidity meter		
	C	Colorimeter		Spectrophotometer		
20	When the sewage becomes stronger, the turbidity of wastewater?				K2	CO-2
	A	Increases		Decreases		
	C	Becomes constant		Slightly decrease		
21	The odor in wastewater ismeasuredby_____				K1	CO-2
	A	Osmoscope		Chromatography		
	C	Olfacto meter		Turbidity meter		
22	_____indicates the freshness ofsewage.				K2	CO-2
	A	Turbidity		Color		
	C	Temperature		COD		
23	_____represents the number of dilutions required to reduceodor.				K1	CO-2
	A	Dispersion		Threshold odor number		
	C	BOD		COD		
24	The odor quality of compound is ammoniacal Identify the type of compound from the following options				K4	CO-2
	A	Acetic acid		Benzene		
	C	Ammonia		Methane		
25	Suspended solids are measured by which of the following?				K3	CO-2
	A	Turbidity rod		Gravimetric test		
	C	Chromatography		Jackson’s turbidity meter		
26	Which method is used to measure the color of water?				K2	CO-2
	A	Gravimetric analysis		Chromatography		
	C	Tintometer method		Hydrometer analysis		
27	The maximum permissible limit for suspended solids is _				K1	CO-2
	A	10 mg/l		20 mg/l		
	C	30 mg/l		40mg/l		
28	1 TCU (True Color Unit) is equivalentto_____				K4	CO-2

	A	The color produced by 1 g of platinum cobalt		The color produced by 1 mg of platinum cobalt		
	C	The color produced by 1 mg of platinum cobalt in 1L of distilled water		The color produced by 1 mg of platinum cobalt in 1mL of distilled water		
29	The maximum desirable limit Bureau of Indian Standards (BIS) of lead in the drinking water is				K1	CO-2
	A	0.05 mg/l		0.09 mg/l		
	C	0.1 mg/l		1.0 mg/l		
30	Zeolite softening process removes				K1	CO-2
	A	only temporary hardness of water		only permanent hardness of water		
	C	both temporary and permanent hardness of water		the dissolved gases in permanent hard water		
31	Conventional tertiary treatment is				K1	CO-3
	A	chemical coagulation and flocculation		Filtration		
	C	sedimentation		none of these		
32	The maximum desirable limit (BIS) of total hardness (as $CaCo_3$) in drinking water is				K2	CO-3
	A	600 ppm		300 ppm		
	C	500 ppm		1000 ppm		
33	The activated sludge process is sometime referred as				K3	CO-3
	A	fluid bed biological oxidation system		turning bed biological oxidation system		
	C	fixed bed biological oxidation system		none of the above		
34	When temporary hard water is boiled, one of the substances formed is				K2	CO-3
	A	calcium bicarbonate		calcium sulfate		
	C	hydrogen chloride		carbon dioxide		
35	The methods used for biological treatment are				K1	CO-3
	A	lagoon		activated sludge process		
	C	oxidation ditches		all of these		
36	Both temporary and permanent hardness of water can be removed on boiling water with				K1	CO-3
	A	calcium hydroxide		sodium carbonate		
	C	calcium oxide		calcium carbonate		
37	Which of the following physical method is used as germicidal in modern time for the treatment of drinking water?				K2	CO-3
	A	Chlorination		Treating with potassium permagnate		

	C	UV radiation		Treating with bleaching powder		
38	Secondarytreatmentuses_____to consumewastes.				K1	CO-3
	A	chemicals		micro-organisms		
	C	filtration		none of these		
39	Acid used mostly for removal of milk stone is				K3	CO-3
	A	Acid used mostly for removal of milk stone is		nitric acid		
	C	gluconic acid		tartaric acid		
40	According to BIS the maximum permissible limit of dissolved solids in drinking water is				K2	CO-3
	A	1000 mg/l		1. 500 mg/l		
	C	2. 2000 mg/l		3. 2000 mg/l		
41	Fishes can store morequantityof_____in theirbodies.				K2	CO-3
	A	Hg		Cl		
	C	Bi		Pd		
42	The_____is an important requirement of the aquaticlife.				K4	CO-3
	A	Dissolved nitrogen		Dissolved chlorine		
	C	Dissolved oxygen		Dissolved methane		
43	Which of the following is a waterborne disease?				K2	CO-3
	A	Typhoid		Cholera		
	C	Diarrhoea		All of the above		
44	The main sources of Arsenic in waterare_____				K2	CO-3
	A	Floods		Industrial waste		
	C	Both b and c		Fertilizers		
45	Which of the following diseases or infections is caused due to poor water hygiene?				K1	CO-3
	A	Leprosy		Trachoma		
	C	Conjunctivitis		All of the above		
46	Which of the following is mainly responsible for the causes of water pollution?				K1	CO-4
	A	Afforestation		Oil refineries		
	C	Paper factories		Both b and c		
47	Chlorofluorocarbon are nonflammable chemicals mainly usedin _____				K2	CO-4
	A	Perfumes		Refrigerators		
	C	Air conditioners		All of the above		
48	What are the health effects of excess fluoride in drinking water?				K2	CO-4
	A	Fluorosis		Lung disease		

	C	Toothaches		Intestinal infection		
49	The optimum value in natural wateris _____				K1	CO-4
	A	2-4ppm		4-7ppm		
	C	4-6ppm		2-7ppm		
50	In most freshwater lakes, the algal productivity is limited by the availability of which of the following inorganic ions?				K3	CO-4
	A	C		N		
	C	P		All of the above		
51	Nitrification is performed by a small groupof_____				K2	CO-4
	A	Viruses		Autotrophic bacteria		
	C	Fungi		Eutrophic bacteria		
52	What is the minimum percentage of solids in wastewater?				K1	CO-4
	A	30 %		40 %		
	C	50 %		60 %		
53	What is the percentage of settleable solids in municipal wastewater?				K2	CO-4
	A	60 %		70 %		
	C	80 %		90 %		
54	What is the colour of the wastewater after 6 hours of a generation?				K4	CO-4
	A	Grey		Light brown		
	C	Dark brown		Dark grey		
55	Which of the following is not a volatile organic compound?				K2	CO-4
	A	Hydrochloric acid		Acetaldehyde		
	C	Dichloromethane		Formaldehyde		
56	What is the maximum pH that the bacteria can sustain in terms of alkalinity?				K2	CO-4
	A	7		7.5		
	C	8		8.5		
57	What is the intermediate zone composed of in aerobic-anaerobic ponds?				K1	CO-4
	A	Algae		Aerobic bacteria		
	C	Organic solids		Facultative bacteria		
58	Nitrification efficiency is significantly suppressed as the temperatureis _____				K5	CO-4
	A	Increased		Decreased		

	C	Neutral		Maintained		
59	……..is a process which involves further removal of the nitrogen.				K1	CO-4
	A	Nitrification		Denitrification		
	C	c) Ammonification		Reduction		
60	In rotating biological contractors, what percent of corrugated plastic discs are submerged?				K3	CO-4
	A	20		40		
	C	50		60		
61	5 days-biochemical oxygen demand (BOD_5) is taken at a temperature of				K2	CO-5
	A	0°C		15°C		
	C	20°C		25°C		
62	A well oxidized sewage contains nitrogen mainly as				K4	CO-5
	A	Nitrates		Nitrites		
	C	Free ammonia		None of these		
63	In a sludge tank, the gas mainly produced, is				K1	CO-5
	A	O_2		N_2		
	C	H_2		CO_2		
64	…… Disease caused by eating fish found in water contaminated with industrial waste having mercury is				K1	CO-5
	A	Brights disease		Osteosclerosis		
	C	Hashimotos disease		Minamata disease		
65	…… made organisms to build their ecosystem in quatic?				K2	CO-5
	A	Force from other organisms		Increase in water level		
	C	Curiosity		Evolution		
66	Which of the following is the major source of fresh water which is available in India?				K1	CO-5
	A	Pond water		Ground water		
	C	Ocean water		River water		
67	Which is the first state in India to make roof top rain water harvesting compulsory to all the houses				K2	CO-5
	A	Kerala		Assam		
	C	Goa		Tamil Nadu		
68	The type of solids which floats in sewage is ……				K1	CO-5
	A	Total solids		Settleable solids		
	C	Dissolved solids		Suspended solids		

69	…… is used to find the D.O content of sewage				K3	CO-5
	A	Kjeldahl method		Winkler method		
	C	Olfactometer		Chromatography		
70	The permissible dose of chloride in domestic sewage is				K1	CO-5
	A	10ppm		250ppm		
	C	120ppm		1ppm		
71	Bio-chemical oxygen demand (BOD) for the first 20 days in generally referred to				K2	CO-5
	A	First stage demand		Carbonaceous demand		
	C	Initial demand		All of these		
72	Thedistancebetweenthecentresofthepeaksofdoubletiscalledas?				K4	CO-5
	A	couplingconstant		spin constant		
	C	spinspincoupling		chemicalshift		
73	H_2, CH_4, C_2H_6 and C_6H_6 exhibit which PMRspectra?				K2	CO-5
	A	Singlet		Doublet		
	C	Triplet		Quintet		
74	Permanent hard water may be softened by passing it through				K2	CO-5
	A	Sodium phosphate		Sodium silicate		
	C	Sodium hexametaphosphate		Sodium bicarbonate		
75	Which of the following physical method is used as germicidal in modern time for the treatment of drinking water?				K4	CO-5
	A	UV radiation		Treating with bleaching powder		
	C	Treating with potassium $KMnO_4$		Chlorination		

TABLE OF SPECIFICATIONS (Question wise – No. of questions)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	4	4	2	3	2	0	15
II	6	3	3	2	1	0	15
III	5	7	2	1	0	0	15
IV	5	6	2	1	1	0	15
V	6	6	1	1	1	0	15
Total	26	26	10	9	4	0	75

TABLE OF SPECIFICATIONS (Marks wise – Total marks)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	4	4	2	3	2	0	15
II	6	3	3	2	1	0	15
III	5	7	2	1	0	0	15
IV	5	6	2	1	1	0	15
V	6	6	1	1	1	0	15
Total	26	26	10	9	4	0	75

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205**.**						
Programme	**B.Sc**	Programme Code	**UCH**		Regulations		**2018-2019**
Department	**Chemistry**		Semester				**4**
Course Code	Course Name		Periods per Week		Credit	Maximum Marks	
			L	P	C	CA	ESE / Total
18U4CHC04	**Core Paper –IV General Chemistry - IV**		6	0	5	25	75 / 100
COURSE OBJECTIVES	1.To study about the fundamentals and applications of nuclearchemistry. 2.Toacquiretheknowledgeaboutcarboxylicacids,itsderivatives,AliphaticandAromaticamines. 3.3.To understand the principle and significance ofthermodynamics.						
POs	**PROGRAMME OUTCOME**						
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme ofstudy.						
PO 2	Ability to express thoughts and ideas effectively in writingand orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,						
PO 3	Capability to apply analytic thought to a body of knowledge;analyse and evaluate evidence,arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,						
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.						
PO 5	Ability to evaluate the reliability and relevance of evidence;identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusionsetc.,						
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,						
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group,and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.						
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.						
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.						
PO 10	Capability to use ICT in a variety of learning situations,demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.						

PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,

COs	**COURSE OUTCOME**
CO 1	Students identify the fundamentals and applications of nuclear chemistry.
CO 2	Students demonstrate the preparations and properties of mono and dicarboxylic acids.
CO 3	Students understand about the Nomenclature, preparations and properties of some aliphatic and aromatic amines.
CO 4	Students learn about the concepts and significance of various thermodynamic functions
CO 5	Students analyze about the bond energy, free energy, exothermic and endothermic reactions.
Pre-requisites	

Knowledge Levels			
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing			
CO / PO / KL Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)			
COs	KLs	**POs**	**KLs**
CO 1	4	PO 1	2
		PO 2	1
CO 2	6		
		PO 3	5
CO 3	2	PO 4	5
		PO 5	4
CO 4	1	PO 6	6
		PO 7	2
CO 5	4		
		PO 8	4
PSOs	KLs	PO 9	1
		PO 10	3
PSO 1	3		
		PO 11	3
PSO 2	4	PO 12	2
		PO 13	1
PSO 3	1	PO 14	6
		PO 15	3

CO / PO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	**PROGRAMME OUTCOME (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO2	1	1	2	2	1	3	1	1	1	1	1	1	1	3	1
CO3	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO4	2	3	1	1	1	1	2	1	3	1	1	2	3	1	1
CO5	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2

CO / PSO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					
COs	**Programme Specific Outcome (POs)**				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	1	2	1	2
PSO2	3	1	1	1	3
PSO3	1	1	2	3	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II &Model 2. Assignment 3. End SemesterExaminations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Nuclear Chemistry**	Periods	12
	Constitution of the nuclei - stable and unstable nuclei and their relationship to (n/p) ratio. Nuclear forces - Natural radioactivity - modes of decay - Radioactive decay series - Nuttal rule and average life - Radioactive equilibrium - Mass defect and binding energy - Numerical problems - Artificial transmutation and artificial radioactivity. Nuclear fission - atom Bomb and nuclear reactors - Nuclear fusion - fusion reaction in the sun, Hydrogen bomb. Application of radioactive isotopes - C14 dating, rock dating - Isotopesas tracers - Medicinal Applications.		
	Carboxylic acids and derivatives	Periods	12

Unit - II	General preparation and reactions of Monocarboxylic acids - Preparation, properties and uses of Dicarboxylic acids: Succinic, Maleic and Fumaric acid. Hydroxy acids: Lactic acid, Malic acid, Tartaric and Citric acid. Aromatic dicarboxylic acid: Phthalic acid.Acid derivatives: preparations of Acid chlorides, Anhydrides, Esters and amides. Reactions involving acid derivatives - Hofmann, Curtius, Lossen and Schmidtrearrangements.		
Unit - III	**Organic Nitrogen Compounds**	Periods	12
	Aliphatic Amines: Nomenclature - Separation of amines by Hinsberg's and Hoffmann methods - General methods of preparation and properties of primary amines. Distinction between 10, 20 and 30 amines .Aromatic Amines: Basicity of Aromatic amines - Derivatives of aniline - Acetanilide -preparation and properties. Diazonium compounds - Diazotization mechanism, preparation and properties of diazoaceticester.		
Unit - IV	**Thermodynamics - II**	Periods	12
	Limitations of first law - Need for second law - Spontaneous process - cyclic process - Carnot cycle - efficiency - Carnot theorem - thermodynamic scale of temperature. Concept of Entropy - Units ofEntropy - entropy a state function - entropy change in isothermal expansion of an ideal gas - Calculation of entropy changes of an ideal gas with changes in P, V & T. Entropy of mixture of ideal gases - physical significance of entropy. Work & free energy functions - partial molar free energy - Gibbs Duhemequation - Gibbs-Helmholtz equation - Clapeyron - Clausius equation. Third law ofthermodynamics		
Unit - V	**Thermochemistry**	Periods	12
	Introduction - Enthalpy change in a chemical reaction - Exothermic and endothermic reactions - Relation between heats of reaction at constant volume and pressure - Standard Enthalpy - Determination of enthalpies - Kirchoffs equation - Hess's Law and its applications - measurement of enthalpy – Bond energy and its applications - Nernst Heat theorem -Flame temperature and Explosiontemperature.		
	Total Periods		**60**

Text Books	
1	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry (33rd edition), Vishal publishing co., (2017).
2	Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry , (47th edition) Vishal publishing co., (2017).
3	Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (22nd edition), New Delhi,S. Chand & Co., (2016).
References	
1	Morrison R.T. and Boyd R.N., Organic Chemistry (6th edition), New York, Allyn & Bacon Ltd., (1992).

2	Madan.R.D., Inorganic Chemistry (3rd edition), New Delhi, S. Chand and Co., (2012).
3	Mukherji.S.M, Singh.S.P, Kapoor.R.P, Organic Chemistry volume â€“ I (4th edition) New Age International (p) limited (1998).
E-References	
1	http://www.ltcconline.net/stevenson/2008CHM101Fall/CHM101Lecture Notes20081201a. htm
2	https ://www.askiitians.com/iit-jee-amines-and-nitrogen-containing-compounds/amines-and-its-preparation-methods/
3	nptel.ac.in/courses/101104063/25

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205**.**						
Programme	**B.Sc**	Programme Code	**UCH**		Regulations		**2018-2019**
Department	**Chemistry**		Semester				**4**
Course Code	Course Name		Periods per Week	Credit	Maximum Marks		
			L / P	C	CA	ESE	Total
18U4CHA02	**Allied Chemistry – II (Botany/Zoology)**		5 / 0	5	25	75	100
COURSE OBJECTIVES	To compile students with various chromatography techniques and its applications towards industries and research laboratories.To educate about the chemistry of bio-organic and bio-inorganic compounds and various kinds of drugs and its uses.						
POs	**PROGRAMME OUTCOME**						
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme ofstudy.						
PO 2	Ability to express thoughts and ideas effectively in writingand orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,						
PO 3	Capability to apply analytic thought to a body of knowledge;analyse and evaluate evidence,arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,						
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.						
PO 5	Ability to evaluate the reliability and relevance of evidence;identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusionsetc.,						
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,						
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group,and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.						
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.						
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.						
PO 10	Capability to use ICT in a variety of learning situations,demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.						

PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,

COs	**COURSE OUTCOME**
CO 1	Students predict the concept of various chromatographic techniques.
CO 2	Students identify the details of bio organic compounds and bio inorganic compounds.
CO 3	Students utilize knowledge of antipyretics, analgesic, antiseptics, disinfectants and anesthetics
CO 4	Students analyze the structure of different haem proteins.
CO 5	Students evaluate the different pharmaceutically important compounds and their uses in real life.
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**KLs**	**POs**	**KLs**
CO 1	4	PO 1	2
		PO 2	1
CO 2	2		
		PO 3	5
CO 3	3	PO 4	5
		PO 5	4
CO 4	4	PO 6	6
		PO 7	2
CO 5	5		
		PO 8	4
PSOs	**KLs**	PO 9	1
		PO 10	3
PSO 1	3		
		PO 11	3
		PO 12	2
PSO 2	4		
		PO 13	1
PSO 3	1	PO 14	6
		PO 15	3

CO / PO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	**PROGRAMME OUTCOME (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3
CO4	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO5	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1

CO / PSO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					
COs	Programme Specific Outcome (**POs**)				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	2	3	2	1
PSO2	3	1	2	3	2
PSO3	1	2	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II &Model 2. Assignment 3. End SemesterExaminations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Chromatography**	Periods	12
	Chromatography -definition-types- column, paper, thin layer -method of separation application- Difference between paper chromatography and thin layer chromatography. High pressure liquid chromatography- HPLC-principle-experimental techniques - instrumentation and advantages.		
Unit - II	**Amino acids and Carbohydrates**	Periods	12
	Aminoacids- Preparation- Gabriel method, Strecker synthesis- Isoelectric point, Reactions of glycine. Polypeptide- Proteins- Classification- primary structure and its functions. Carbohydrates-definition, Classification, Preparation and Reactions of glucose and fructose- Inter conversion of glucose to fructose and vice versa- sucrose and starch		
	Bio-inorganic Chemistry	Periods	12

Unit - III	Structure of chlorophyll, phorphyrin unit and photosynthesis. Nitrogen fixation, carbon cycle. structure of haem proteins: haemoglobin, myoglobin. Oxygen transport and respiration. Metallo enzymes, vitamins containing metals.		
Unit - IV	**Pharmaceutical Chemistry-II**	Periods	12
	Structure and mode of action: Analgesics and Antipyretics-salicylic acid derivatives-aspirin, p-aminophenol derivatives- para acetamol and ibuprofen. Antiseptic and disinfectants-definition and distinction, crystal violet, acridine. Anaesthetics-definition, classification- local and general, preparation, properties and uses of cocaine and benzococaine.		
Unit - V	**Organic Analysis**	Periods	12
	Qualitative analysis of organic substances: test for saturation and unsaturation; aliphatic & aromatic; acidic and basic nature of organic compound; elements test for N, S and halogens: functional groups like acid, phenol, aldehyde, ketone, carbohydrate, amine, ester, amide and diamide.		
	Total Periods		**60**

Text Books	
1	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry,50th edition, New Delhi, S. Chand & Co., (2011). R., Sharma L.R., Kalia K.K., Principles of
2	Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry 23rdedition. New Delhi, S. Chand &Co., 2004. Applied Chemistry, New Delhi, S. Chand & Co., 2008.
3	V. Venkateswaran, R. Veeraswamy and A.R.Kulandaivelu, Basic Principles of Practical Chemistry, New Delhi, S.Chand & Co, 1995.
4	Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, 22nd edition, New Delhi, S. Chand & Co., 2016.
5	Pandey.O.P, Bajpai.D.N., Giri.S., Practical Chemistry, New Delhi, S.Chand & Co, 2012.
References	
1	Jayashree Ghosh .S, Fundamental concepts of Applied Chemistry, New Delhi, S. Chand & Co., 2008.
2	Sharma.B.K., Industrial chemistry including chemical engineering -16th- Meerut, Krishnaprakasam media. 2011.
E-References	
1	https://www.khanacademy.org/test-prep/mcat/chemical-processes/separations-purifications/a/principles-of-chromatography
2	https://en.wikipedia.org/wiki/Carbohydrate.
3	https://chem.libretexts.org/

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205**.**						
Programme	**B.Sc**	Programme Code	**UCH**		Regulations		**2018-2019**
Department	**Chemistry**		Semester				**4**
Course Code	Course Name		Periods per Week		Credit	Maximum Marks	
			L	P	C	CA	ESE / Total
18U4CHA04	**Allied Chemistry – II (Physics)**		5	0	5	25	75 / 100
COURSE OBJECTIVES	To gain knowledge about coordination compounds and natural products such as amino acids and carbohydrates.Acquire the knowledge about medicinal drugs and dyes						
POs	**PROGRAMME OUTCOME**						
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme ofstudy.						
PO 2	Ability to express thoughts and ideas effectively in writingand orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,						
PO 3	Capability to apply analytic thought to a body of knowledge;analyse and evaluate evidence,arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,						
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.						
PO 5	Ability to evaluate the reliability and relevance of evidence;identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusionsetc.,						
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,						
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group,and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.						
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.						
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.						
PO 10	Capability to use ICT in a variety of learning situations,demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.						
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.						

PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,

COs	**COURSE OUTCOME**
CO 1	Students will learn the basic concepts of coordination compounds and its applications.
CO 2	Students will know about the aminoacids,proteins and carbohydrates.
CO 3	Students will gain knowledge regarding electrode potential and batteries.
CO 4	Students will enhance their knowledge towards pharamaceutical and industrial chemistry.
CO 5	Students will dyes and its importance.
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**KLs**	**POs**	**KLs**
CO 1	2	PO 1	2
		PO 2	1
CO 2	2		
		PO 3	5
CO 3	3	PO 4	5
		PO 5	4
CO 4	4	PO 6	6
		PO 7	2
CO 5	4		
		PO 8	4
PSOs	**KLs**	PO 9	1
		PO 10	3
PSO 1	3		
		PO 11	3
		PO 12	2
PSO 2	4		
		PO 13	1
PSO 3	1	PO 14	6
		PO 15	3

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	PROGRAMME OUTCOME (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3
CO4	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO5	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2

CO / PSO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					
COs	Programme Specific Outcome (POs)				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	2	3	2	2
PSO2	1	1	2	3	3
PSO3	2	2	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II &Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Coordination compounds**	Periods	12
	Addition compounds-double salts and complexes. Complexes Mononuclear complexes only) General aspects-central metal atom,Ligand-types of ligands.Coordination number and oxidation state of central metal atom-Nomenclature-Theories of Complexes- Werners theory,Sidgwick theory,EAN rule,VBT-its applications to $[Cu(NH_3)_4]^{2+}$, $[Ni(CO)_4]$, $[Co(NH_3)_6]^{3+}$ and $[CoCl_6]^{3-}$ Chelation-Meaning examples – EDTA applications.		
Unit - II	**Amino acids and Carbohydrates**	Periods	12
	Aminoacids - Preparation - Gabriel method, Strecker synthesis-Isoelectric point,Reactions of glycine.Polypeptide-Proteins - Classification-primary structure and its functions.Carbohydrates - definition,Classification,Preparationand Reactions of glucose and fructose-Inter conversion of glucose to fructose and vice versa-sucrose and starch		
	Electrochemistry-II	Periods	12

Unit - III	Cells-Galvanic cell with examples.Electrode potential-single electrode potential- Standard electrode potential-Nernt equation-derivation-electrochemical series and its applications- EMF-Applications of EMF measurements:Determination of pH by using hydrogen electrode- Reference electrodes:hydrogen electrode and calomel electrode-Reversible and irreversible cell-Batteries-definitio - lead acidbattery		
Unit - IV	**Pharmaceutical Chemistry-II**	Periods	12
	Structure and mode of action: Analgesics and Antipyretics-salicylic acid derivatives-aspirin, p-aminophenol derivatives- paracetamol and ibuprofen. Antiseptic and disinfectants-definition and distinction, crystal violet, acridine. Anaesthetics - definition, classification-local and general, preparation,properties and uses of cocaine and benzo cocaine		
Unit - V	**Applied Chemistry-II**	Periods	12
	Dyes-definition-requisites of a true dye, classification of dyes - based on structure and mode of application, colours and chemical constitution-Witts theory, Bayer theory. Dyeing forces-ionic interactions, hydrogen bonds, vander-waals interaction, covalent bonds with examples, cross dyeing - principle only. Basic operations in dyeing process-preparation of fiber and dye bath, applications of dye andfinishing		
	Total Periods		**30**

Text Books	
1	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry 33rd edition,Vishal publishing co.,2017.
2	Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (19th edition), New Delhi, S. Chand & Co., (2010).
3	Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry (23rdedition). New Delhi, S. Chand &Co., (2004).
References	
1	Jayashree Ghosh .S, Fundamental concepts of Applied Chemistry, New Delhi, S. Chand & Co., (2008).
2	Sharma.B.K., Industrial chemistry including chemical engineering (16th) Meerut, Krishnaprakasammedia. (2011).
E-References	
1	https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/carbhyd.htm
2	http://dyes-pigments.standardcon.com/what-is-dye.html

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205**.**						
Programme	**B.Sc**	Programme Code	**UCH**		Regulations		**2018-2019**
Department	**Chemistry**		Semester				**4**
Course Code	Course Name		Periods per Week		Credit	Maximum Marks	
			L	P	C	CA	ESE / Total
18U4CHAP01	**Allied Chemistry Practicals**		3	0	5	25	75 / 100
COURSE OBJECTIVES	To understand the principles of volumetric analysis. To enable the students to have hands-on training on qualitative analysis of organic						

POs	**PROGRAMME OUTCOME**
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme ofstudy.
PO 2	Ability to express thoughts and ideas effectively in writingand orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,
PO 3	Capability to apply analytic thought to a body of knowledge;analyse and evaluate evidence,arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.
PO 5	Ability to evaluate the reliability and relevance of evidence;identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusionsetc.,
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group,and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.
PO 10	Capability to use ICT in a variety of learning situations,demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.

PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,

COs	**COURSE OUTCOME**
CO 1	Students will learn how to conduct a volumetric estimation process precisely. .
CO 2	Students will understand reactions taking place during the experiment.
CO 3	Students will plan, conduct, review and report the experiment
CO 4	The students will learn the nature, significance, and influence of errors and how they may best be avoided or minimized during quantitative examination of a chemical compound. Students will gain knowledge about analysis of organic compounds.
CO 5	Students will evaluate the reactivity of various functional groups.
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**KLs**	**POs**	**KLs**
CO 1	2	PO 1	2
		PO 2	1
CO 2	2		
		PO 3	5
CO 3	5	PO 4	5
		PO 5	4
CO 4	2	PO 6	6
		PO 7	2
CO 5	5		
		PO 8	4
PSOs	**KLs**	PO 9	1
		PO 10	3
PSO 1	3		
		PO 11	3
		PO 12	2
PSO 2	4		
		PO 13	1
PSO 3	1	PO 14	6
		PO 15	3

CO / PO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	**PROGRAMME OUTCOME (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1
CO4	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO5	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1

CO / PSO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					
COs	Programme Specific Outcome (**POs**)				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	2	1	2	1
PSO2	1	1	2	1	2
PSO3	2	2	1	2	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II &Model 2. Assignment 3. End SemesterExaminations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Volumetric Estimations-Acidimetry**	Periods	9
	1. Estimation of sodium hydroxide-standard sodiumcarbonate 2. Estimation of Oxalic acid -standard-oxalicacid. 3. Estimation of Hydrochloric acid - standard oxalicacid		
Unit - II	**Permanganometry**	Periods	9
	1.Estimation of oxalic acid-std-Mohrs salt or ferrous sulphate. 2.Estimation of sodium nitrite-standard oxalic acid. 3.Estimation of ferrous ion.		
Unit - III	**Qualitative Organic Analysis**	Periods	9
	Systematic analysis of organic compounds:Characterization of Organic compounds by their functional groups and confirmation by preparation of derivative.Functional groups that may be studied:Aldehydes, Ketones, carboxylic acids.		

Unit - IV	**Qualitative Organic Analysis**	Periods	9
	Systematic analysis of organic compounds:Characterization of Organic compounds by their functional groups and confirmation by preparation of derivative.Functional groups that may be studied: aromatic primary amines, phenol,amide, diamide.		
Unit - V	**Qualitative Organic Analysis**	Periods	9
	Systematic analysis of organic compounds:Characterization of Organic compounds by their functional groups and confirmation by preparation of derivative.Functional groups that may be studied: Nitro compounds and monosaccharides.		
	Total Periods		**45**

Text Books	
1	1. V. Venkateswaran, R. Veeraswamy and A.R.Kulandaivelu, Basic Principles of Practical Chemistry, New Delhi, S. Chand & Co, (1995).
References	
1	.Pandey O. P, Bajpai D. N., Giri S., Practical Chemistry, New Delhi, S.Chand & Co, (2012).
E-References	
1	1. http://wwwchem.uwimona.edu.jm/lab_manuals/c10expt25.html
2	2. http://vlab.amrita.edu/?sub=2&brch=191&sim=345&cnt=1
3	3. http://amrita.olabs.edu.in/?sub=73&brch=8&sim=116&cnt=1

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205**.**						
Programme	**B.Sc**	Programme Code	**UCH**		Regulations		**2018-2019**
Department	**Chemistry**		Semester				**4**
Course Code	Course Name	Periods per Week			Credit	Maximum Marks	
		L			C	CA	ESE	Total
18U4CHN04	**FOOD AND NUTRITION**	2	NIL	NIL	2	25	75	100
COURSE OBJECTIVES	1. To provide energy for doing works. 2. To protect the human beings from infections and deficiency disorders. 3. To increase knowledge on food and nutrition security concepts at the national and sub-national levels.						
POs	**PROGRAMME OUTCOME**						
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme ofstudy.						
PO 2	Ability to express thoughts and ideas effectively in writingand orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,						
PO 3	Capability to apply analytic thought to a body of knowledge;analyse and evaluate evidence,arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,						
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.						
PO 5	Ability to evaluate the reliability and relevance of evidence;identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusionsetc.,						
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,						
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group,and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.						
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.						
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.						
PO 10	Capability to use ICT in a variety of learning situations,demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.						
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.						

PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,

COs	**COURSE OUTCOME**
CO 1	Students will gain knowledge in describing general nutritional components emphasizing regulation of dietary carbohydrates, fat, and protein metabolism and their impact on nutritional status and health.
CO 2	Students will evaluate others aspects of food quality.
CO 3	Students can impact of food preservation, processing, packaging and distribution on food quality.
CO 4	Students produce a variety of food products applying principles of food handling and preparation
CO 5	Students can give an overview of the main classes of compounds influencing color and flavor of food and have knowledge on important sources of vitamins and minerals in food
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**KLs**	**POs**	**KLs**
CO 1	4	PO 1	2
		PO 2	1
CO 2	2		
		PO 3	5
CO 3	6	PO 4	5
		PO 5	4
CO 4	5	PO 6	6
		PO 7	2
CO 5	4		
		PO 8	4
PSOs	**KLs**	PO 9	1
		PO 10	3
PSO 1	3		
		PO 11	3
		PO 12	2
PSO 2	4		
		PO 13	1
PSO 3	1	PO 14	6
		PO 15	3

CO / PO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	**PROGRAMME OUTCOME (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	1	1	2	2	1	3	1	1	1	1	1	1	1	3	1
CO4	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1
CO5	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2

CO / PSO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					
COs	Programme Specific Outcome (**POs**)				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	2	1	1	2
PSO2	3	1	1	2	3
PSO3	1	2	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II &Model 2. Assignment 3. End SemesterExaminations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Food Sources**	Periods	6
	Introduction-types-sources-nutrients of foods: carbohydrate, protein, fats, oils - functions of food.		
Unit - II	**Food Poisoning and Adulteration**	Periods	6
	Food poisoning: Sources, causes and remedy- Food adulteration: Types, common adulteration in food.		
Unit - III	**Food Preservation and Processing**	Periods	6
	Importance of food preservation- principles of food preservation -Food spoilage, causes of food spoilage - types of Food spoilage - preservation and processing by heating: sterilisation, pasterusation.		
Unit - IV	**Vitamins**	Periods	6
	Definition-types-functions, Sources, deficiency diseases of A, C, K, E and B1,B12,B6.		
Unit - V	**Minerals**	Periods	6
	Mineral elements in food - source and daily requirements of ca, Na, K, Mg, Fe and P.		
	Total Periods		30

Text Books	
1	Sumati R.Mudambi, M.V.Rajagopal, Fundamentals of Foods and nutrition,Fourth edition 2003, New Age International Publishers, New Delhi .
2	. M.Swaminathan, Handbook of Food and Nutrition, The Bangaloreprintingand publishingCo.,Ltd, Bangalore.
References	
1	N.Shaguntala Manay, M.shadaksharaswamy, Foods Facts and Principles,secondedition, NewAge International Publishers, New Delhi .
2	B.Srilakshmi, Food Science,Secondedition, New Age InternationalPublishers,New Delhi.
3	Dr.Kusum Gupta, Dr.L.C.Gupta, Abhishek Gupta, Food and Nutrition,Fourthedition, JaypeeBrothers medical publishers, New Delhi.
E-References	
1	https://Foodandnutrition.net
2	https://www.edx.org

Signature of BOS Chairman

QP CODE- 18U4CHC04

VIVEKANANDHA COLLEGE OF ARTS & SCIENCES FOR WOMEN

(AUTONOMOUS)

DEPARTMENT OF CHEMISTRY

B.Sc. DEGREE EXAMINATION

IV-SEMESTER

MODEL QUESTION- GENERAL CHEMISTRY – IV

Time: 3 Hrs. Max.Marks : 75

Section A

Answer all questions (20 x 1 = 20)

1	Radioactivity was discovered by				K1	CO-1
	A	J.J. Thomson		Madame Curie		
	C	Henry Becquerel		Rutherford		
2	Out of the following the one which has no charge				K1	CO-1
	A	gamma rays		beta rays		
	C	alpha rays		cathode rays		
3	Hydrogen bomb is based on the phenomenon of				K1	CO-1
	A	nuclear explosion		chemical reaction		
	C	nuclear fusion		nuclear fission		
4	When a radioactive nucleus emits an alpha particle, the mass number of the atom				K3	CO-1
	A	remains same and its atomic number decreases		decreases and its atomic number increases		
	C	decreases and its atomic number decreases		increases and its atomic number decreases		
5	The one which does not undergo cyclisation is				K2	CO-2
	A	lactic acid		maleic acid		
	C	succinic acid		phthalic acid		
6	Acetyl chloride cannot be obtained by treating acetic acid with				K2	CO-2
	A	PCl_5		$SOCl_2$		
	C	$CHCl_3$		PCl_3		
7	Lactic acid on oxidation with alk. $KmnO_4$ gives				K3	CO-2
	A	tartaric acid		pyruvic acid		
	C	cinnamic acid		propionic acid		

8	Tartaric acid is a				K2	CO-2
	A	monohydroxybutanedioic acid		dihydroxybutanedioic acid		
	C	monohydroxypropanedioic acid		dihydroxyproapanedioic acid		
9	Which pairing of general formula and compound class is incorrect?				K2	CO-3
	A	$R_3C\text{-}NH_2$& tertiary amine		$RCONH_2$& amide		
	C	RNH_2& primary amine		$(RCO)_2NH$ & imide		
10	Carbylamine reaction is possible for				K2	CO-3
	A	1^0 amine		2^0 amine		
	C	3^0 amine		None		
11	Which among the following is a primary amine?				K2	CO-3
	A	N-methylaniline		Aniline		
	C	N,N-dimethylaniline		None		
12	The basicity order of amines				K4	CO-3
	A	$R_3N>R_2NH>RNH_2>ArNH_2$		$R_2NH>R_3N>RNH_2>ArNH_2$		
	C	$R_0N>RNH_2>R_2NH>ArNH_2$		$RNH_2>R_2NH>R_3N>ArNH_2$		
13	The efficiency of the Carnot cycle is the function of				K1	CO-4
	A	temperatures (T1, T2) between which the Carnot cycle operates		net work done (W_{net})		
	C	heat supplied (Q1) and heat rejected (Q2)		all the above		
14	Entropy is a measure of				K1	CO-4
	A	orderliness		disorderliness		
	C	both a & b		None		
15	What happens to entropy when ice melts into water?				K2	CO-4
	A	it increases		it becomes zero		
	C	it remains unchanged		it decreases		
16	According to third law of thermodynamics, which of the following quantity for a perfectly crystalline solid is zero at absolute zero				K2	CO-4
	A	entropy		free energy		
	C	internal energy		Enthalpy		
17	In exothermic reaction,				K2	CO-5
	A	ΔE is zero		ΔH is negative		
	C	ΔS is zero		ΔG is zero		

18	Variation of heat of reaction with temperature is known as				K1	CO-5
	A	Van't Hoff isotherm		Van't Hoff isochore		
	C	Kirchhoff's equation		None		
19	Evaporation of water				K2	CO-5
	A	exothermic change		endothermic change		
	C	does not involve any heat change		Unpredictable		
20	The relationship between enthalpy change and internal energy change				K3	CO-5
	A	$\Delta H=\Delta E+P\Delta V$		$\Delta H=\Delta E-P\Delta V$		
	C	$\Delta H=-(\Delta E+P\Delta V)$		$\Delta H=P\Delta V-\Delta E$		
	Section B **Answer All questions (5 x 5 = 25)**					
21	A	Derive the relation between mass defect and binding energy.			K4	CO-1
		OR				
	B	Explain any five applications of radioactive isotopes.			K3	CO-1
22	A	How do you differentiate maleic and fumaric acid?			K2	CO-2
		OR				
	B	Explain the mechanism of Schmidt rearrangement.			K4	CO-2
23	A	Write any three differences between 1^0, 2^0 & 3^0 amines.			K1	CO-3
		OR				
	B	Explain the mechanism of diazotization of amines.			K4	CO-3
24	A	What are the physical significance of entropy?			K3	CO-4
		OR				
	B	Derive Gibb's - Duhem equation.			K2	CO-4
25	A	Write a note on Nernst heat theorem			K1	CO-5
		OR				
	B	State Hess's law and explain its applications.			K1	CO-5
	Section C **Answer ANY THREE Questions (3 x 10 = 30)**					
26		Explain the applications of nuclear fission.			K3	CO-1
27		Explain any five chemical properties of monocarboxylic acid.			K1	CO-2
28		How will you separate the mixture of amines by Hinsberg method?			K3	CO-3

29		Explain in detail about carnot cycle.	K1	CO-4
30		Derive Kirchhoff's equation.	K2	CO-5

TABLE OF SPECIFICATIONS (Question wise – No. of questions)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	3	0	3	1	0	0	7
II	1	4	1	1	0	0	7
III	1	3	1	2	0	0	7
IV	3	3	1	0	0	0	7
V	3	3	1	0	0	0	7
Total	20	10	2	2	1	0	35

TABLE OF SPECIFICATIONS (Marks wise – Total marks)

Outcome/Uni t	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	3	0	16	5	0	0	24
II	10	8	1	5	0	0	24
III	5	3	10	6	0	0	24
IV	12	7	5	0	0	0	24
V	11	1 2	1	0	0	0	24
Total	41	3 0	33	16	0	0	120

QP CODE-18U4CHA02

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN

(AUTONOMOUS)

DEPARTMENT OF CHEMISTRY

B.Sc., DEGREE EXAMINATION

MODEL QUESTION- ALLIED CHEMISTRY – II

(BOTANY/ZOOLOGY)

Time: 3 Hrs. Max.Marks:75

Section A

Answer all questions (20 x 1 = 20)

1	Which technique is used to separate the the compounds on the basis of differencein affinities ofphase				K1	CO-1
	A	Chromatography	B	Polarography		
	C	Thermography	D	Chromography		
2	In which type of chromatographic separation occurs due to difference in partition co- efficients?				K1	CO-1
	A	Paper	B	column		
	C	Thin layer	D	Gas		
3	Rf value is the distance travelled by the compound to the distance travelled by the--- -				K1	CO-1
	A	Solvent	B	Solute		
	C	Elution	D	All		
4	Which type of chromatography is applied to coloured and colourlesssubstance				K3	CO-1
	A	Paper	B	Column		
	C	Thin layer	D	HPLC		
5	Aminoacidscontain ---------- functionalgroups				K2	CO-2
	A	1	B	2		
	C	3	D	4		
6	---------- is the pH at which the amino acid does not migrate in an electricfield.				K2	CO-2
	A	Isoelectricpoint	B	electric point		
	C	Electronicpoint	D	None		
7	The amino acids in a polypeptidechainarelinkedby ---------- bonds.				K3	CO-2
	A	Peptide	B	Amino bond		
	C	Covalent	D	Ionic		

8	Aldehyde group present in carbohydrate is knownas------				K2	CO-2
	A	Aldose	B	ketose		
	C	Hexose	D	sucrose		
9	Vitaminsareclassifiedinto ---------- types.				K2	CO-3
	A	2	B	3		
	C	4	D	5		
10	Which element present in the chlorophyll?				K2	CO-3
	A	Mg	B	Ca		
	C	P	D	CO		
11	Basic unit ofPhorphyrin				K2	CO-3
	A	Indole	B	Imdazole		
	C	Quinole	D	Pyrole		
12	Which element is present in thehaemoglobin?				K4	CO-3
	A	Cu	B	Ag		
	C	Fe	D	Au		
13	Which metal found in vitaminB12?				K1	CO-4
	A	Co	B	Cu		
	C	Mg	D	Sn		
14	Which one is example for Narcoticanalgesics?				K1	CO-4
	A	Morphine	B	Papaverine		
	C	salicyladehyde	D	Benzoicacid		
15	Salicyladehyde group ofAspirin				K2	CO-4
	A	$COOCH_3$	B	CHO		
	C	Cl	D	NO_2		
16	p-aminophenol used for				K2	CO-4
	A	Painreliver	B	Anti-inflammatory		
	C	Anti-septicsagen	D	anti-bacterialdrugs		
17	Which among the following compound found only in liquid nature ?				K2	CO-5
	A	Amine	B	acid		
	C	Monoamide	D	all		
18	Which compound shows aliphaticnature.?				K1	CO-5
	A	Carbohydrate	B	amine		
	C	Monoamide	D	acid		

19	Which among the following compounds contain nitrogen?				K2	CO-5
	A	Aldehyde	B	amine		
	C	Acid	D	Alcohol		
20	Which test gives positive result foramides.?				K3	CO-5
	A	Biurettest	B	Silver mirrortest		
	C	Lieberrmannstest	D	Phthalein fusiontest.		
	Section B **Answer All questions (5 x 5 = 25)**					
21	A	Difference between paper andcolumnchromatography.			K4	CO-1
		OR				
	B	Write short notes on methods of separation of column chromatography			K3	CO-1
22	A	Explain the preparation of amino acids byGabrielmethod.			K2	CO-2
		OR				
	B	Write the preparation of glucose.			K4	CO-2
23	A	Explain the structureofprotein.			K1	CO-3
		OR				
	B	Write short notes on nitrogen fixation.			K4	CO-3
24	A	Explain the mode of Action of paracetamol&ibuprofen.			K3	CO-4
		OR				
	B	Explain the analgesics with examples.			K2	CO-4
25	A	Explain the classification of dye based onitsstructure.			K1	CO-5
		OR				
	B	Explain the basic operations in dyeing process.			K1	CO-5
	Section C **Answer ANY THREE Questions (3 x 10 = 30)**					
26		Explain the instrumentation and application ofHPLC.			K3	CO-1
27		Explain primary structure of proteins &itsfunction			K1	CO-2
28		Explain oxygen transport andrespiration.			K3	CO-3
29		Explain the classification of Anesthetics withexample.			K1	CO-4
30		How will you identify the given organic compound as phenol andaldehyde?			K2	CO-5

TABLE OF SPECIFICATIONS (Question wise – No. of questions)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	3	0	3	1	0	0	7
II	1	4	1	1	0	0	7
III	1	3	1	2	0	0	7
IV	3	3	1	0	0	0	7
V	3	3	1	0	0	0	7
Total	20	10	2	2	1	0	35

TABLE OF SPECIFICATIONS (Marks wise – Total marks)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	3	0	16	5	0	0	24
II	10	8	1	5	0	0	24
III	5	3	10	6	0	0	24
IV	12	7	5	0	0	0	24
V	11	12	1	0	0	0	24
Total	41	30	33	16	0	0	120

QP CODE-18U4CHA02

`VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

DEPARTMENT OF CHEMISTRY

B.Sc., DEGREE EXAMINATION

MODEL QUESTION- ALLIED CHEMISTRY – II

(PHYSICS)

Time: 3 Hrs. Max.Marks : 75

Section A

Answer all questions (20 x 1 = 20)

1	Which of the following is an example for coordination compound?				K-2	CO-1
	A	NaCl	B	$FeSO_4(NH_4)_2SO_4.H_2O$		
	C	$K_4[Fe(CN)_6]$	D	$MgSO_4$		
2	Example for a neutral ligand				K-4	CO-1
	A	F^-	B	H_2O		
	C	H_2O	D	Na^+		
3	What is the Coordination number of Cu in $[Cu(NH_3)_4]^{2+}$?				K-2	CO-1
	A	2	B	0		
	C	4	D	1		
4	Calculate EAN for the complex $[Co(NH_3)_6]^{3+}$				K-1	CO-1
	A	36	B	38		
	C	39	D	40		
5	Aminoacids contains				K-2	CO-2
	A	only amino acid group	B	both amino and acid group		
	C	only acid group	D	none		
6	The molecular formula for glucose is				K-2	CO-2
	A	$C_6H_{12}O_6$	B	$C_6H_{10}O_6$		
	C	$C_{12}H_{24}O_{11}$	D	none of these		
7	Starch is a				K-4	CO-2
	A	monosaccharide	B	disaccharide		
	C	polysaccharide	D	none of these		
8	Fructose on reduction gives				K-2	CO-2
	A	n-butane	B	propane		
	C	n-hexane	D	n-pentane		

9	The reaction takes place at anode is				K-1	CO-3
	A	oxidation	B	reduction		
	C	ionisation	D	elimination		
10	Which of the following is not a reference electrode?				K-5	CO-3
	A	hydrogen	B	platinum		
	C	silver	D	calomel		
11	Calomel electrode contains				K-4	CO-3
	A	HgCl	B	Hg_2Cl		
	C	Hg_2Cl_2	D	none		
12	The electroplating of zinc on iron is called				K-1	CO-3
	A	valcanisation	B	galvanisation		
	C	both	D	none		
13	The drug used to reduce fever is called				K-2	CO-4
	A	analgesic	B	antipyretic		
	C	antibiotic	D	none of these		
14	Which one of the following is an antipyretic?				K-1	CO-4
	A	dettol	B	penicillin		
	C	aspirin	D	all of these		
15	Which is one of the following is not a pain killer?				K-5	CO-4
	A	aspirin	B	ibuprofen		
	C	paracetamol	D	coniine		
16	The drugs used to block nerve conduction to prevent pain				K-2	CO-4
	A	antiseptic	B	antipyretic		
	C	antibiotics	D	anaesthetic		
17	The substance that imparts colour to the material is called				K-5	CO-5
	A	pigment	B	dye		
	C	both	D	none of these		
18	Indigo is a				K-4	CO-5
	A	Acid dye	B	base dye		
	C	vat dye	D	both a and b		
19	The one which intensifies the colour of the substrate is called				K-2	CO-5
	A	chromophore	B	auxochrome		

	C	hypochrome	D	hypochrome		
20	Azodyes contain-------- group				K-4	CO-5
	A	-NO_2	B	-N=N-		
	C	–N=N=N-	D	$–NH_2$		
	Section B **Answer ANY ONE Question (5 x 5 = 25)**					
21	A	Define the terms: i) central metal ion i) Ligand ii) coordination number			K4	CO-1
		(OR)				
	B	Explain EAN with examples.			K3	CO-1
22	A	Explain the preparation of amino acids by Gabriel method.			K2	CO-2
		(OR)				
	B	How do you convert glucose into fructose?			K4	CO-2
23	A	Write the principle of Electroplating & its uses.			K1	CO-3
		(OR)				
	B	Explain the terms batteries.			K4	CO-3
24	A	Write a note on the mode of action of paracetamol & ibuprofen.			K3	CO-4
		(OR)				
	B	Explain the analgesics			K2	CO-4
25	A	Explain the classification of dye based on structure			K1	CO-5
		(OR)				
	B	Explain the basic operations in dyeing process.			K1	CO-5
	Section C **Answer ANY ONE Question (3 x 10 = 30)**					
26	Explain the postulates of Werner’s theory.				K3	CO-1
27	Explain any five reactions of glucose.				K1	CO-2
28	Write an elaborate note on electrochemical series and its applications.				K3	CO-3
29	Explain in detail about the classification of anaesthetics.				K1	CO-4
30	Write the preparation of Malachite Green & Crystal Violet.				K2	CO-5

TABLE OF SPECIFICATIONS (Question wise – No. of questions)

Outcome/Unit	K1 (Remembering	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	3	0	3	1	0	0	7
II	1	4	1	1	0	0	7
III	1	3	1	2	0	0	7
IV	3	3	1	0	0	0	7
V	3	3	1	0	0	0	7
Total	20	10	2	2	1	0	35

TABLE OF SPECIFICATIONS (Marks wise – Total marks)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	3	0	16	5	0	0	24
II	10	8	1	5	0	0	24
III	5	3	10	6	0	0	24
IV	12	7	5	0	0	0	24
V	11	12	1	0	0	0	24
Total	41	30	33	16	0	0	120

QP CODE-18U4CHN04

VIVEKANANDHA COLLEGE OF ARTS & SCIENCES FOR WOMEN
(AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
B.Sc., DEGREE EXAMINATION
IV- SEMESTER MODEL QUESTION-
NMEC- FOOD ANDNUTRITION

Time: 3 Hrs. Max.Marks : 75

Section A
Answer all questions (75 x 1 = 75)

1	The six essential nutrients are.....				K1	CO-1
	A	Carbohydrates,lipids, enzymes,vitamins, minerals, andwater	B	Carbohydrates, proteins, antioxidants, vitamins, minerals, andwater		
	C	Carbohydrates, proteins, fats, vitamins, minerals, and water	D	None of these		
2	What are the two forms of carbohydrates ?				K2	CO-1
	A	Single and Double	B	Simple and Complex		
	C	Sugars and Starch	D	None of these		
3	What is the main purpose of carbohydrates for the body?				K2	CO-1
	A	They provide chemicals to help repair cells and aid in digestion	B	They help regulate hormones and body temperature within the body		
	C	They are the main source of energy for the body.	D	They helps in controlling the emotions		
4	When a person eats too many carbohydrates over time, that person may develop.....				K2	CO-1
	A	Heart disease or cancer.	B	Diabetes or hypoglycemia		
	C	Hypertension	D	Hemophilia		
5	Rice is the crop which contains more amountof.....				K2	CO-1
	A	Carbohydrates	B	Proteins		

	C	Fats	D	Oils		
6	Molecular formula for Starch is.....				K1	CO-1
	A	$C_6H_{12}O_6$	B	$C_6H_{10}O_5$		
	C	$C_{12}H_{22}O_{11}$	D	$C_{12}H_{22}O_{12}$		
7	Which is called as Grape Sugar?				K1	CO-1
	A	Glucose	B	Fructose		
	C	Maltose	D	Sucrose		
8	Which is present in Cane Sugar and in Honey?				K1	CO-1
	A	Sucrose	B	Maltose		
	C	Fructose	D	Glucose		
9	Which solution gives blue colour with a drop of Iodine ?				K1	CO-1
	A	Glucose solution	B	Sucrose solution		
	C	Starch solution	D	Lactose solution		
10	Wheat, corn, barely, rice and potatoes are rich sources of.....				K1	CO-1
	A	Glucose	B	Fructose		
	C	Starch	D	Maltose		
11	Identify the reducing sugar				K1	CO-1
	A	Sucrose	B	Cellulose		
	C	Starch	D	Glucose		
12	Which is a monosaccharide among the following				K1	CO-1
	A	Cellulose	B	Sucrose		
	C	Glucose	D	Maltose		
13	Ripe grapes mainly contains.....				K1	CO-1
	A	Glucose	B	Fructose		
	C	Sucrose	D	Maltose		
14	What foods usually contain saturated fats?				K1	CO-1
	A	Beans, nuts, and grains	B	Meats, seafood, and dairy		
	C	Fruits, vegetables, and oils	D	None of these		
15	Proteins are not sensitive to.....				K1	CO-1
	A	Acids	B	Bases		
	C	Elevated temperature	D	Water		
16	Which of the following is the most common causes of food poisoning?				K1	CO-2

	A	Red kidney beans	B	Moulds		
	C	Bacteria	D	Toadstools		
17	Which one of the following statements best describes the effect that food poisoning bacteria usually have upon food?				K1	CO-2
	A	It appears normal but it tastes horrible	B	It appears stale and dry and it has an off taste.		
	C	It tastes, smells and looks normal.	D	It appears and tastes normal but it has an unpleasant		
18	Which one of the following statements is true?				K1	CO-2
	A	All bacteria are harmful.	B	Some bacteria are harmful		
	C	No bacteria are harmful	D	Only bacterial spores are harmful.		
19	At which of the following temperatures will food poisoning bacteria multiply most rapidly?				K1	CO-2
	A	5°F	B	37°C		
	C	37°F	D	63°C		
20	Which of the following is most likely to be a source of food poisoning bacteria?				K1	CO-2
	A	Frozen peas	B	Pasteurized milk		
	C	Tinned salmon	D	Raw meat		
21	Which one of the following food poisoning bacteria is transferred to food by coughing and sneezing?				K2	CO-2
	A	Bacillus cereus	B	Salmonella		
	C	Staphylococcus aureus	D	Clostridium perfringens		
22	Which one of the following pairs of people are at special risk from food poisoning?				K2	CO-2
	A	Nurses and children	B	Children and old people		
	C	Old people and chefs	D	Chefs and nurses		
23	If food is reheated, to what temperature and for how long should it be heated ?				K3	CO-2
	A	70°C for 2 minutes	B	50°C for 2 minutes		
	C	50°C for 10 minutes	D	30°C for one hour		
24	The main symptom of Staphylococcus food poisoningis.....				K2	CO-2
	A	vomiting	B	diarrhea		
	C	fever	D	abdominal pains		
25	This is an adulterant				K1	CO-2
	A	Pesticides	B	Urea		

	C	Iron filings in tea	D	All of the above		
26	The full form of PFA is.....				K4	CO-2
	A	Prevention of Food Act	B	Protection of Food Act		
	C	Prevention of Food Adulteration	D	None of the above is correct		
27	Statement 1: Adulteration takes place more in loosely sold items than those sold packed. Statement 2: Powder and paste forms are more adulterated than solidlumps.				K3	CO-2
	A	True, False	B	True, True		
	C	False, False	D	False, True		
28	Why are adulterants added in the food ?				K2	CO-2
	A	To increase shelf-life of products. E.g.- Urea	B	To improve flavor color and appearance		
	C	To sell lesser quantity at the same price	D	All the mentioned		
29	Methods for detection of common adulterants are.....				K4	CO-2
	A	Visual tests	B	Chemical tests		
	C	Physical tests	D	All of the mentioned		
30	Coffee is adulterated with.....				K3	CO-2
	A	Chicory	B	Saw dust		
	C	Ghee	D	All of these		
31	Which of the following is a factor that affects the storage stability of food?				K2	CO-3
	A	Type of raw material used	B	Quality of raw material used		
	C	Method/effectiveness packaging	D	All of the mentioned		
32	Which of the following sentence is true with respect to food storage/preservation?				K2	CO-3
	A	Each food type has potential storage life	B	The mechanical abuse that food Has received during storage/distribution		
	C	All of the mentioned	D	None of the mentioned		
33	Statement 1: Foods ofplant origin can be used as additives for food preservation. Statement 2: Dry fruits and seeds are the most important higher plant structures used as food.				K4	CO-3
	A	True, False	B	True, True		
	C	False, False	D	False, True		

34	Which of the following statement with respect to food preservation is true?				K6	CO-3
	A	Leafy vegetables perish fast due to their high moisture content	B	Cereals have the highest requirements of moisture and soil types		
	C	Cereal can be grown with less labour and yield of food is high	D	All of the mentioned		
35	Bacteria and yeast can.....				K2	CO-3
	A	Grow with or without air	B	Need humid/warm conditions to grow		
	C	Need more moisture than molds	D	All the mentioned statementsare correct		
36	Which of the following fact is correct with respect to the food preservation industry?				K2	CO-3
	A	Majority of high quality foods in the world are the highly perishable food items	B	More people with more than adequate standard of living exist and hence the demand for safe preserved food is growing		
	C	Food preservation market is going to boom as more people are shifting to areas where there is more industrial growth	D	All of the mentioned statements are correct		
37	Statement 1: Shellfish are consumed by local people. Statement 2: Polished rice is just as nutritious as unpolished rice.				K1	CO-3
	A	True, False	B	True, True		
	C	False, False	D	False, True		
38	Food processing in India is concentrated in which sector, maximum?				K1	CO-3
	A	Organized Sector	B	Unorganized sector		
	C	Small Scale	D	None of the mentioned		
39	Pasteurization is the process of heating milk at what temperature?				K2	CO-3
	A	Above 121 degree Celsius	B	Above boiling point		
	C	Below boiling point	D	Above 150 degree Celsius		
40	The reason for food spoilage is.....				K2	CO-3
	A	Growth of microorganisms like bacteria, fungus etc	B	Autolysis		
	C	Oxidation by air that causes rancidity	D	All of these are correct		

41	All the following techniques are house hold preservation technique, except:				K4	CO-3
	A	Smoking	B	Lyophilisation		
	C	Dehydration	D	Salting		
42	The process of preserving the food by rapid freezing followed by dehydration under vacuum is called.....				K2	CO-3
	A	Lyophilisation	B	Sterilization		
	C	Cold dehydration	D	Cryopreservation		
43	Acetic acid and lactic acid are used for.....				K1	CO-3
	A	Curing meats	B	Preservation of color		
	C	Preservation of pickles	D	Inhibiting mold growth		
44	Sterilization occurs at high temperatures for long periods of time.				K4	CO-3
	A	True	B	False		
	C	None	D	None		
45	Phosphatase enzyme present in milk is destroyed in which of the following processes?				K3	CO-3
	A	Sterilization	B	Canning		
	C	Dehydration	D	Pasteurization		
46	Which of the following is not a fat-solublevitamin?				K1	CO-4
	A	Vitamin D	B	Vitamin K		
	C	Vitamin C	D	Vitamin A		
47	Which of the following vitamin is also known as cobalamin?				K2	CO-4
	A	Vitamin B11	B	Vitamin B12		
	C	Vitamin B6	D	Vitamin B2		
48	Which of the following vitamin serves as a hormone precursor?				K2	CO-4
	A	Vitamin C	B	Vitamin A		
	C	Vitamin K	D	Vitamin D		
49	Vitamin C is present in ……				K1	CO-4
	A	Tomatoes	B	Papaya		
	C	Guava	D	All of these		
50	Name a substance that makes a vitamin metabolically ineffective?				K3	CO-4
	A	Anti - vitamin	B	Antioxidants		
	C	Cynocobalamine	D	Riboflavinosis		

51	A normal healthy manrequiresdaily ..... of VitaminB2.				K4	CO-4
	A	120 mg	B	150 mg		
	C	170 mg	D	190 mg		
52	Which Vitamin helps in promoting growth of children and increase in the RBC level?				K2	CO-4
	A	Vitamin B1	B	Vitamin B2		
	C	Vitamin B6	D	Vitamin B12		
53	Vitamin E is also called as ……				K2	CO-4
	A	Calciferol	B	Tocopherol		
	C	Menadione	D	Thiamine		
54	Which of following is a good and rich source of Vitamin 'C' ?				K1	CO-4
	A	Milk	B	Radish		
	C	Mango	D	Banana		
55	Vitamin 'A' is necessary in our bodyfor.....				K2	CO-4
	A	Prevention of blood clotting	B	Synthesis of hemoglobin		
	C	Proper vision	D	Improving Digestion		
56	Which of the following fruits are not rich source of VitaminC?				K1	CO-4
	A	Dates	B	Orange		
	C	Lemon	D	Guavas		
57	Liver is rich of ……..				K1	CO-4
	A	Carbohydrate	B	Fat soluble vitamins		
	C	Lipids	D	Proteins		
58	The presence of cobalt in Vitamin B12 can be detected by ……				K4	CO-4
	A	Spectroscopy	B	Borax – bead test		
	C	Sodium nitroprusside test	D	Hydrolysis test		
59	Which organ stores fat soluble vitamins?				K1	CO-4
	A	Blood	B	Skin		
	C	Liver	D	Pancreas		
60	Which of the following is the rich source of Vitamin A?				K2	CO-4
	A	Egg yolk	B	Leafy vegetables		
	C	Chocolate	D	Cardamom		
61	Which one of the following element is required for muscle contraction?				K1	CO-5

	A	Calcium	B	Iron		
	C	Sodium	D	Zinc		
62	A person suffering from high blood pressure should avoid foods which are rich in ……				K3	CO-5
	A	Sodium	B	Iodine		
	C	Calcium	D	Iron		
63	Which are three following primary nutrients needed for our growth of our human body?				K1	CO-5
	A	Calcium, Sulphur and Magnesium	B	Nitrogen, Phosphorus and Potassium		
	C	Zinc, Boron and Copper	D	Calcium, Zinc and Copper		
64	Deficiency of which mineral causes dark green coloration of the leaves?				K4	CO-5
	A	Phosphorus	B	Potassium		
	C	Nitrogen	D	Calcium		
65	Which one the following is the important sources for sodium mineral?				K5	CO-5
	A	Meat	B	Dairy products		
	C	Table salt	D	Leafy vegetables		
66	The important energy rich nutrient of calcium mineral is……..				K2	CO-5
	A	Fish	B	Legumes		
	C	Meat	D	Tea		
67	What is the average level of calcium rich food should be taken in our daily diet?				K4	CO-5
	A	700 mg/day	B	1000 - 1200 mg/day		
	C	260 mg/day	D	500 mg/day		
68	What is the important function of Magnesium mineral inhuman?				K1	CO-5
	A	Amino acid synthesis	B	Cholesterol metabolism		
	C	ATP Stabilization	D	Fluid balance		
69	What amount of Magnesium mineral is required to take through our daily diet?				K1	CO-5
	A	700 mg/day	B	310 - 420 mg/day		
	C	1000 – 1200 mg/day	D	260 mg/day		
70	What is the important function of Iron mineral in our human body?				K2	CO-5
	A	Regulates Protein synthesis	B	Antioxidant		
	C	Improving immune function	D	Fluid balance		

71	What is the important function of Phosphorus mineral in our human body?				K2	CO-5
	A	Antioxidant	B	Improving immune function		
	C	pH balance	D	Fluid balance		
72	What are the important sources of Phosphorus mineral?				K4	CO-5
	A	Sea food	B	Tea		
	C	Cereals	D	Cocoa		
73	All of the following are the components of foods except ……				K2	CO-5
	A	Carbohydrates	B	Proteins		
	C	Vitamins	D	Fiber		
74	Important nutrients required to our human body are ……				K1	CO-5
	A	Carbohydrates	B	Vitamins		
	C	Proteins and Minerals	D	Fats		
75	The recommended daily requirement of Iron for women of 18 – 55 years of age is ……				K3	CO-5
	A	5 mg	B	8 mg		
	C	10 mg	D	15 mg		

TABLE OF SPECIFICATIONS (Question wise – No. of questions)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	1 1	4	-	-	-	-	15
II	6	4	3	2	-	-	15
III	3	7	1	3	-	1	15
IV	6	6	1	2	-	-	15
V	5	4	2	3	1	-	15
Total	31	25	7	10	1	1	75

TABLE OF SPECIFICATIONS (Marks wise – Total marks)

Outcome/Unit	K1 (Remembering)	K2 (Understanding)	K3 (Applying)	K4 (Analyzing)	K5 (Evaluating)	K6 (Creating)	Total
I	1 1	4	-	-	-	-	15
II	6	4	3	2	-	-	15
III	3	7	1	3	-	1	15
IV	6	6	1	2	-	-	15
V	5	4	2	3	1	-	15
Total	31	25	7	10	1	1	75

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	**B.Sc**	Programme Code	**UCH**			Regulations	**2018-2019**	
Department	**Chemistry**		Semester				**5**	
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
18U5CHCO5	**CORE PAPER-V: ORGANIC CHEMISTRY-I**		5			05	25	75	100
Course Objectives	1. To gain knowledge about stereoisomerism. 2. Acquire the knowledge about heterocycles. 3. To understand the reaction mechanism and reagents in organic synthesis.							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.							
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.							
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.							
PO 4	Apply one's learning to real life situations.							
PO 5	Analyse and synthesise data from a variety of sources.							
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.							
PO 11	Ability to work independently, identify appropriate resources required for a project.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.							
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.							
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.							
PO 15	Ability to acquire knowledge and skills.							

COs	COURSE OUTCOME
CO 1	Student will be able to get an insight into basic concept of stereoisomerism.
CO 2	Students will be skilled in solving the problems related to isomerism.
CO 3	Students will have a firm foundation in the fundamentals of heterocyclic chemistry, methods of synthesis and application of those methods for the preparation of specific groups of heterocyclic systems.
CO 4	Students will have a clear understanding of mechanisms in organic reactions.
CO 5	Students will be skilled enough to choose a reagent to carry out organic reactions.
Pre-requisites	

KNOWLEDGE LEVELS

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

Cos	KLs	POs	KLs
CO 1	1	PO 1	1
		PO 2	3
		PO 3	5
CO 2	3	PO 4	2
		PO 5	4
		PO 6	2
CO 3	2	PO 7	6
		PO 8	4
		PO 9	2
CO 4	4	PO 10	3
		PO 11	1
		PO 12	5
CO 5	3	PO 13	4
		PO 14	2
		PO 15	1

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**Programme Outcome (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	1	1	2	1	2	1	1	2	1	3	1	1	2	3
CO2	1	3	1	2	2	2	1	2	2	3	1	1	2	2	1
CO3	2	2	1	3	1	3	1	1	3	2	2	1	1	3	2
CO4	1	2	2	1	3	1	1	3	1	2	1	2	3	1	1
CO5	1	3	1	2	2	2	1	2	2	3	1	1	2	2	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Stereochemistry-I**	Periods	12
	Stereoisomerism - definition - classification into optical and geometrical isomerism – optical isomerism - optical activity - conditions for optical activity - asymmetric centre - achiral molecule - elements of symmetry - meaning of + and - , d and l notations - Racemization - methods of racemization - Resolution - methods of resolution -Walden inversion - Notations for optical isomers: Cahn-Ingold-Prelog rules - R-S notation - Erythro and threo representations.		
Unit - II	**Stereochemistry-II**	Periods	12
	Optical activity in compounds containing no asymmetric carbon: biphenyls, allenes and spiranes - Optical activity of lactic and tartaric acid - Geometrical isomerism: cis-trans, syn-anti, E-Z notations - Geometrical isomerism in maleic and fumaric acids - Methods of distinguishing geometrical isomers: dipole moment, dehydration and heat of hydrogenation.		
Unit - III	**Heterocyclic compounds**	Periods	12
	Heterocyclic compounds: five membered and fused heterocyclic rings: pyrrole, furan, thiophene and indole - structure, preparation and properties - aromaticity-relative reactivity of pyrrole, furan and thiophene towards electrophilic substitution reaction-preparation of six membered and fused heterocyclic compounds: pyridine, quinoline, isoquinoline		
Unit - IV	**Molecular rearrangements**	Periods	12
	Benzil-benzilic acid, Wolff, Beckmann, Cope, Hofmann, Curtius, Favorski, Schmidt and Fries rearrangements.		
Unit - V	**Reagents of synthetic importance**	Periods	12
	Sodium borohydride, Lithium aluminium hydride, Manganese dioxide, N-bromosuccinimide, Osmium tetraoxide, Periodic acid, Ziegler-Natta catalyst and Grignard reagent.		
Total Periods			60

Text Books	
1	I.L. Finar, Organic chemistry Vol I sixth edition, ELBS, Pearson Education Ltd.,2004
2	I.L. Finar, Organic chemistry Vol II fifth edition, ELBS, Pearson Education Ltd.,2012
3	O.P. Agarwal, Reactions and Reagents, Krishna prakashan media (p) Ltd., 1975
4	P.S. Kalsi, Stereochemistry, Conformation and Mechanism, New Age International (p) Ltd, VIIth, 2008.
5	B.S. Bhal and Arun Bhal, A text book of organic chemistry, S.Chand & company ltd, 1948.
References	
1	K.S.Tewari, and N.K.Vishoni, Organic Chemistry, Vikas Publishing House.
2	P.L. Soni and H.M. Chawla Text book of organic chemistry, 26th revised edition, Sultan chand and sons, 1995.
3	R.T.Morrison and Boyd, Organic Chemistry, VIth edition, PHI Learning Pvt Ltd., 2008.
4	M. K. Jain and S. C. Sharma, Modern Organic Chemistry, Vishal Publishing Co. 2018.
5	B. Mehta and M. Mehta, Organic Chemistry, PHI learning Publishers.
E-References	
1	https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Supplemental_Modules_(Organic_Chemistry)/Fundamentals/Isomerism_in_Organic_Compounds/Optical_Isomerism_in_Organic_Molecules
2	https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Supplemental_Modules_(Organic_Chemistry)/Fundamentals/Isomerism_in_Organic_Compounds/Geometric_Isomerism_in_Organic_Molecules
3	http://www.3rd1000.com/chem301/chem302a.htm
4	https://www.scribd.com/doc/97295442/Molecular-Rearrangements
5	https://www.wiley.com/en-us/Molecular+Rearrangements+in+Organic+Synthesis-p-9781118347966

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	**B.Sc**	Programme Code	**UCH**			Regulations	**2018-2019**	
Department	**Chemistry**		Semester				**5**	
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
18U5CHCO6	**CORE PAPER-VI: INORGANIC CHEMISTRY-I**		5			05	25	75	100
Course Objectives	1. To help the student to understand the basic concepts in inorganic chemistry and to develop their critical thinking. 2. To learn the basics and applications of the inorganic compounds. 3.To learn the coordination complexes and limitation.							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.							
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.							
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.							
PO 4	Apply one's learning to real life situations.							
PO 5	Analyse and synthesise data from a variety of sources.							
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.							
PO 11	Ability to work independently, identify appropriate resources required for a project.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.							
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.							
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.							
PO 15	Ability to acquire knowledge and skills.							

COs	COURSE OUTCOME
CO 1	Students known basics in acid and bases
CO 2	Students able to understand the solvents
CO 3	Students enhanced their knowledge of coordination complexes
CO 4	Students learn the importance of f- block elements
CO 5	Students will be able to interpret the applications of inorganic compounds in day to day life.
Pre-requisites	

KNOWLEDGE LEVELS			
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing			
CO / PO / KL Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)			
Cos	KLs	POs	KLs
CO 1	1	PO 1	2
		PO 2	3
		PO 3	5
CO 2	3	PO 4	1
		PO 5	4
		PO 6	3
CO 3	2	PO 7	6
		PO 8	3
		PO 9	1
CO 4	4	PO 10	2
		PO 11	4
		PO 12	4
CO 5	5	PO 13	2
		PO 14	2
		PO 15	5

CO / PO Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	1	1	3	1	1	1	1	3	2	1	1	2	2	1
CO2	2	3	1	1	2	3	1	3	1	2	2	2	2	2	1
CO3	3	2	1	2	1	2	1	2	2	3	1	1	3	3	1
CO4	1	2	2	1	3	2	1	2	1	1	3	3	1	1	2
CO5	1	1	3	1	2	1	2	1	1	1	2	2	1	1	3

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Modern Concepts of Acids and Bases**	Periods	12
	Acids and Bases - Arrhenius concept - Bronsted - Lowry concept - Luxflood concept - Lewis concepts of acids and bases - Usanovich concept - Conjugate acid - base pairs - Relative strength of acids and bases: Hydracids & Oxyacids - Levelling & Differentiating solvents - Solvent system concept. Hard and Soft Acids and Bases - Classification of acids and bases as hard and soft – examples - Pearson's HSAB Principle and its applications.		
Unit - II	**Non-Aqueous Solvents**	Periods	12
	Classification of solvents - General Characteristics of a solvent, Reaction in non aqueous solvents with reference to liq NH_3, Solutions of alkali metals in ammonia, liq SO_2, anhydrous H_2SO_4, liq.HF, and molten salts.		
Unit - III	**Chemistry of f-Block Elements**	Periods	12
	Position in the periodic table - general characteristics of Lanthanides and Actinides- Lanthanide contraction and its consequences - Isolation of Lanthanides from monazite including the Ion exchange resin methods - Actinides - occurrence and preparation - Chemistry of thorium and uranium.		
Unit - IV	**Coordination Chemistry-I**	Periods	12
	Definition and classification of ligands - Nomenclature of mononuclear and poly nuclear complexes - chelating ligands - chelate effect - coordination number and stereochemistry of complexes - Isomerism in complexes - structural isomerism - stereo isomerism - geometrical isomerism and optical isomerism in 4 and 6 coordinated complexes – Werner's theory & its evidences - Sidgwick theory - EAN rule and its applications.		
Unit - V	**Coordination Chemistry-II**	Periods	12
	Theories of bonding in complexes: VB theory - postulates - Hybridization and Geometry of complexes - Outer orbital and inner orbital octahedral complexes - Square planar - tetrahedral complexes - Magnetic properties of complexes - limitations of VB theory. Crystal Field Theory - postulates - d orbital splitting in octahedral, tetrahedral and square planar complexes - strong and weak field ligands - Spectro chemical series - High spin and Low spin complexes - Colour and Magnetic properties of complexes - CFSE and its uses - Limitations of CFT-Comparison between VBT and CFT.		
Total Periods			60

Text Books	
1	Puri, Sharma, Kalia, Principles of Inorganic Chemistry 32nd Edition (2014), Milestone Publishers and Distributor, New Delhi, Wahid. U. Malik, G. D. Tuli,
2	R. D. Madan, Selected topics in Inorganic Chemistry,S.Chand & company, New Delhi.
References	
1	S. Prakash, G.D. Tuli, S.K. Basu and R.D. Madan, Advanced Inorganic Chemistry - Vol - I (2006), S. Chand Publishing, New Delhi.
2	S. Prakash, G.D. Tuli, S.K. Basu and R.D. Madan, Advanced Inorganic Chemistry - Vol - II (2006), S. Chand Publishing, New Delhi.
E-References	
1	https://en.wikibooks.org/wiki/Introduction_to_Inorganic_Chemistry

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	**B.Sc**	Programme Code	**UCH**			Regulations	**2018-2019**	
Department	**Chemistry**		Semester				**5**	
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
18U5CHCO7	**CORE PAPER-VII: PHYSICAL CHEMISTRY-I**		5			5	25	75	100
Course Objectives	1. To facilitate the students to study about the nature of solutions, kinetics of reactions. 2. To learn the concepts of chemical equilibrium. 3. To acquaint the knowledge for derivation of reaction rates, rate constants of various chemical reactions.							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.							
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.							
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.							
PO 4	Apply one's learning to real life situations.							
PO 5	Analyse and synthesise data from a variety of sources.							
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.							
PO 11	Ability to work independently, identify appropriate resources required for a project.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.							
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.							
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.							
PO 15	Ability to acquire knowledge and skills.							

COs	COURSE OUTCOME
CO 1	Students will learn the laws of solutions and deviations of solution w.r.t. pressure, temperature and volume
CO 2	Students can understand fundamental concepts of chemical equilibrium.
CO 3	Students will have enhanced knowledge towards advanced conception of chemical equilibrium.
CO 4	Students will able to understand and explain the theories of chemical kinetics.
CO 5	Students will be skilled in solving the problems of Kinetics.
Pre-requisites	

KNOWLEDGE LEVELS			
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing			
CO / PO / KL Mapping **(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)**			
Cos	KLs	POs	KLs
CO 1	2	PO 1	2
		PO 2	1
		PO 3	4
CO 2	5	PO 4	2
		PO 5	3
		PO 6	5
CO 3	3	PO 7	3
		PO 8	6
		PO 9	2
CO 4	6	PO 10	3
		PO 11	1
		PO 12	4
CO 5	4	PO 13	2
		PO 14	3
		PO 15	5

CO / PO Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**Programme Outcome (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	3	2	1	2	1	3	2	2	1	3	2	1
CO2	1	1	2	1	1	3	1	2	1	1	1	2	1	1	3
CO3	2	1	2	2	3	1	1	1	2	3	1	2	2	3	1
CO4	1	1	1	1	1	2	1	3	1	1	1	1	1	1	2
CO5	1	1	3	1	2	2	2	1	1	2	1	3	1	2	2

Course Assessment Methods			
Direct			
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations			
Indirect			
1. Course End Delivery			
Content of the Syllabus			
Unit - I	**Solutions**	Periods	12
	Solutions of gases in liquids – Henry's law - solutions of liquids in liquids – Raoult's law. Ideal solution - Binary liquid mixture - deviation from ideal behavior - Thermodynamics of ideal solutions - V-P-composition curves, V-P-temperature curves - Azeotropic distillation. Theory of fractional distillation, Steam distillation, Determination of Solubility, Solubility Curves. Nernst's distribution law- Colligative properties-Introduction, Thermodynamic derivations, applications and limitations. Thermodynamic derivation of elevation of boiling point and depression of freezing point- Van't Hoff factor- Abnormal molecular mass.		
Unit - II	**Chemical Equilibrium- I**	Periods	12
	Reversible reactions - nature of chemical equilibrium - definition, characteristics of chemical equilibrium - Law of mass action. Equilibrium Law - Derivation - equilibrium constant expression in terms of general and concentration, partial pressure and mole fraction- Heterogeneous equilibrium - Related problems. Thermodynamic derivation of law of chemical equilibrium (K_p, K_c and K_x)- Relations between K_p, K_c and K_x - Problems related to K_p and K_c.		
Unit - III	**Chemical Equilibrium- II**	Periods	12
	Equilibrium law for ideal gases - Effect of inert gas on reaction equilibrium. Le Chatelier's principle - effect of change in concentration, pressure and temperature. Derivation of van't Hoff reaction isotherm. de-Donder's treatment of chemical equilibria -Donnan Equilibrium membrane- concept of chemical affinities. Temperature dependence of equilibrium constant – van't Hoff Isochore - Pressure dependence of equilibrium constant.		
Unit - IV	**Chemical Kinetics-I**	Periods	12
	Chemical kinetics and its scope - rate of a reaction, factors influencing the rate of the reaction. Order and molecularity of a reaction: Definition, types - difference between order and molecularity - Derivation of rate constant and half life period for zero, first order reactions - Derivation of rate constant for second order (same and different initial concentrations) and third order reactions (same initial concentrations only). Methods to determine the order of the reaction - Isolation and half life methods. Kinetics of complex reactions. Parallel and consecutive reactions only.		
Unit - V	**Chemical Kinetics-II**	Periods	12
	Theories of chemical kinetics: Arrhenius equation, effect of temperature on rate of reaction, concept of activation energy. Collision theory of reaction rates- introduction, Derivation of rate constant for bimolecular reaction from collision theory, Failures of CT. Lindemann theory - Introduction, Derivation of rate constant for unimolecular reaction. Theory of absolute reaction rates- Introduction, Thermodynamic derivation of rate constant for bimolecular reaction based on ARRT.		
Total Periods			60

Text Books	
1	A. Bahl, B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry, Revised multicolor edition, S. Chand publication Ltd, New Delhi, 2010.
2	B.R. Puri, L.R. Sharma, M.S. Pathania, Principles of Physical Chemistry, (47th edition) Vishal Publishing Co., New Delhi, 2017.
3	N. Kundu and S.K. Jain, Physical Chemistry, S. Chand & Company Ltd, New Delhi, 1990.
References	
1	P. Atkins and J.D. Paula, Physical Chemistry, 7th Edn, Oxford University Press, New York, 2002.
2	J.Rajaram and J.C.Kuriacose, Kinetics and mechanisms of chemical transformations, First edition, Macmillan Publishers India Ltd, New Delhi, 2011.
3	R.P.Rastogi and R.R.Misra, An introduction to chemical thermodynamics, 6th revised edition, Vikas Publishing House Pvt. Ltd, New Delhi, 2005.
E-References	
1	https://www.britannica.com/science
2	https://www.chemqueries.com
3	https://socratic.org/Chemistry
4	https://chem.libretexts.org
5	https://www.askiitians.com/Physical Chemistry/Chemical Kinetics

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	**B.Sc**	Programme Code	**UCH**			Regulations	**2018-2019**	
Department	**Chemistry**		Semester				**5**	
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
18U5CHEO1	**ELECTIVE COURSE - I: ANALYTICAL CHEMISTRY**		5			5	25	75	100
Course Objectives	1. To help the student to develop the habit of accurate manipulation and an attitude of critical thinking. 2. To learn the basic analytical methods and appreciate what is involved in an analysis. 3. To develop the student knowledge to handle the chemicals in proper and hygiene manner.							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.							
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.							
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.							
PO 4	Apply one's learning to real life situations.							
PO 5	Analyse and synthesise data from a variety of sources.							
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.							
PO 11	Ability to work independently, identify appropriate resources required for a project.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.							
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.							
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.							
PO 15	Ability to acquire knowledge and skills.							

COs	COURSE OUTCOME
CO 1	Students will utilize the learned analytical skills in handling various chemical and biochemical instruments.
CO 2	Students will be able to learn basic understanding on precipitation and gravimetric techniques.
CO 3	Students will have basic understanding on purification and separation techniques.
CO 4	Students will be able to interpret the results of quantitative experiments and interpret the data in meaningful way.
CO 5	Students will have a thorough understanding of thermal and electro analytical techniques.
Pre-requisites	

KNOWLEDGE LEVELS			
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing			
CO / PO / KL Mapping **(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)**			
Cos	KLs	POs	KLs
CO 1	2	PO 1	3
		PO 2	5
		PO 3	3
CO 2	1	PO 4	1
		PO 5	2
		PO 6	4
CO 3	4	PO 7	6
		PO 8	2
		PO 9	3
CO 4	3	PO 10	5
		PO 11	4
		PO 12	4
CO 5	5	PO 13	3
		PO 14	2
		PO 15	3

CO / PO Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**Programme Outcome (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	1	2	2	3	1	1	3	2	1	1	1	2	3	2
CO2	1	1	1	3	2	1	1	2	1	1	1	1	1	2	1
CO3	2	2	2	1	1	3	1	1	2	2	3	3	2	1	2
CO4	3	1	3	1	2	2	1	2	3	1	2	2	3	2	3
CO5	1	3	1	1	1	2	2	1	1	3	2	2	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Laboratory Hygiene and safety**	Periods	12
	Storage and handling of corrosive, flammable, explosive, toxic, carcinogenic and poisonous chemicals. Simple first aid procedures for accidents involving acids, alkalis, bromine, burns and cut by glass. Threshold vapour concentration - safe limits. Waste disposal. Heating methods, stirring methods, filtration techniques. Calibration of pipette, standard measuring flask and burette. Weighing principle in chemical balance and single pan balance.		
Unit - II	**Gravimetric Analysis**	Periods	12
	Principle-theories of precipitation-solubility product and precipitation-factors affecting Solubility product- precipitation errors- Co-precipitation and post-precipitation, Reduction of errors. Precipitation from homogeneous solution, washing and drying of precipitate. Calculation in gravimetric analysis - use of gravimetric factor. Choice of precipitant-specific and selective precipitant- Anthranilic acid, cupferon, DMG, ethylenediamine, 8- hydroxyquinoline, salicylaldoxime, use of masking and demasking agent. Crucibles-types, care and uses.		
Unit - III	**Purification Techniques**	Periods	12
	Dessicant: Types of dessicant: Relative efficiencies of dessicant, Drying power and temperature, Regeneration of dessicant, choice of dessicants - Technique of drying: Drying of solids. Purification of solid organic compounds - Recrystallisation, Extraction, sublimation, use of miscible solvents, use of drying agents and their properties. Purification of liquids- Distillation: Theory of distillations; Technique; Fractional distillation, Steam distillation, azeotropic and vaccum distillation.		
Unit - IV	**Chromatographic Techniques**	Periods	12
	Introduction - Adsorption Chromatography-Partition Chromatography. Column Chromatography - principle, types of adsorbents, preparation of the column, elution, recovery of substances and applications. TLC –Principle, Choice of adsorbent and solvent, preparation of chromatoplates, R_f - value, factors affecting the R_f values. Significance of R_f value. Paper chromatography - principle, solvents used, paper electrophoresis - separation of amino acids. Gas Chromatography (GC)-principle - instrumentation and applications of Gas Chromatography (GC) and High pressure liquid chromatography (HPLC). High pressure liquid chromatography (HPLC)-principle - instrumentation and advantages.		
Unit - V	**Thermal and electroanalytical techniques**	Periods	12

	Principle - Thermogravimetric analysis and Differential Thermal Analysis - discussion of various components with block diagram- TGA & DTA curves of $CuSO_4.5H_2O$ and $CaC_2O_4.H_2O$ in air and in CO_2- factors affecting TGA & DTA curves. Polarography- principle, concentration polarization, dropping mercury electrode (DME)- advantages and disadvantages- migration, residual, limiting and diffusion currents- Use of supporting electrolytes- Ilkovic equation (derivation not required) and significance- current voltage curve- oxygen wave. Half wave potential ($E_{1/2}$)- Polarography as an analytical tool in quantitative and qualitative analysis.
Total Periods	60

Text Books	
1	D.A. Skoog, D.M. West and F.J. Holler, Analytical Chemistry: An Introduction, 5th edition, Saunders college publishing, Philadelphia, 1990.
2	U.N. Dash, Analytical Chemistry: Theory and Practice, Sultan Chand and sons Educational Publishers, New Delhi, 1995.
3	R.A. Day Jr. A.L. Underwood, Quantitatives Analysis, 5th edition, Prentice Hall of India Private Ltd., New Delhi, 1988
4	R. Gopalan, Analytical Chemistry, S. Chand and Co., New Delhi
References	
1	Elementary Organic Spectroscopy: Principles and Chemical Applications, S.Chand and company Ltd., Ram Nagar, New Delhi, 1990
2	V.K. Srivastava, K.K. Srivastava, Introduction to Chromatography: Theory and Practice, S. Chand and company, New Delhi, 1987
3	R.M. Roberts, J.C. Gilbert, L.B. Rodewald, A.S. Wingrove, Modern Experimental Organic Chemistry, 4th edition, Holt Saunders international editions
4	A.K. Srivastava, P.C. Jain, Chemical Analysis: An Instrumental Approach for B.Sc. Hons. and M.Sc. Classes, S. Chand and company Ltd., Ram Nagar, New Delhi
E-References	
1	https://www.news-medical.net/life-sciences/Analytical-Chemistry-Techniques.aspx.
2	https://www.toppr.com/guides/chemistry/organic-chemistry/purification-of-organic-compounds
3	https://www.hitachihightech.com/global/products/science/tech/ana/thermal/descriptions/ta.html

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	**B.Sc**	Programme Code	**UCH**			Regulations	**2018-2019**	
Department	**Chemistry**		Semester				**5**	
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
18U5CHSO1	**SKILL BASED ELECTIVE COURSE – I SPECTROSCOPY**		2			2	25	75	100
Course Objectives	Students acquire the knowledge about the fundamentals and different types of spectroscopy. Students can able to interpret unknown compounds through UV, FT-IR, Raman, NMR, Mass spectroscopy. Students can able to identify the structure of unknown compounds and application of spectroscopy.							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.							
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.							
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.							
PO 4	Apply one's learning to real life situations.							
PO 5	Analyse and synthesise data from a variety of sources.							
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.							
PO 11	Ability to work independently, identify appropriate resources required for a project.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.							
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.							
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.							
PO 15	Ability to acquire knowledge and skills.							

COs	COURSE OUTCOME
CO 1	Student will be able to understand the principle, instrumentation and applications of Rotational Spectroscopy.
CO 2	Students will be skilled in UV spectroscopy and it's applications.
CO 3	Students can able to learn theory, laws, and types of band and applications of IR Spectroscopy. Knowledge of students will be developed in the field of Raman spectroscopy by the learning of Scattering, stokes and anti-stokes line etc.
CO 4	Students can able to understand the concept of NMR spectrum and its applications.
CO 5	Students will be skilled in different types of peak, Nitrogen rule and fragmentation of Mass spectroscopy.
Pre-requisites	

KNOWLEDGE LEVELS

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

Cos	KLs	POs	KLs
CO 1	2	PO 1	3
		PO 2	2
		PO 3	4
CO 2	1	PO 4	5
		PO 5	1
		PO 6	4
CO 3	3	PO 7	3
		PO 8	5
		PO 9	2
CO 4	4	PO 10	3
		PO 11	5
		PO 12	4
CO 5	3	PO 13	3
		PO 14	2
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	3	1	1	2	1	2	1	3	2	1	1	2	3	1
CO2	1	2	1	1	3	1	1	1	2	1	1	1	1	2	1
CO3	3	2	2	1	1	2	1	1	2	3	1	2	3	2	1
CO4	2	1	3	2	1	3	2	2	1	2	2	3	2	1	2
CO5	3	2	2	1	1	2	1	1	2	3	1	2	3	2	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Rotational Spectroscopy**	Periods	6
	Fundamental concepts electromagnetic spectrum - Region of spectrum, Interaction of radiation with matter. Rotational Spectroscopy - Principle-Instrumentation-Selection rules for rotational spectroscopy - Molecular rotation-diatomic molecule as rigid rotor-diatomic molecule as non-rigid rotor. Applications of rotation spectra: bond length-isotopic substitution.		
Unit - II	**UV-VIS spectroscopy**	Periods	6
	Theory-Instrumentation-Beer-Lamberts Law - bands in UV-VIS spectrum - possible electronic transitions - types of electronic transitions based on selection rules - characteristic absorption (λmax and εmax) of carbonyl, isolated double bond, conjugated double bond systems and aryl groups - factors influencing the absorption. Spectroscopic terms: Chromophore, Auxochrome, Bathochromic shift, Hypsochromic shift, Hypochromic shift and Hyperchromic shift.		
Unit - III	**IR & Raman Spectroscopy**	Periods	6
	Theory-Instrumentation- Hooke's Law - bands in IR spectrum - Units- Number and types of fundamental vibrations-Modes of vibrations and their energies- Factor affecting the frequency of absorption-Conjugation, inductive effect and hydrogen bonding. Applications of IR -Identification of Functional groups. Rayleigh scattering and Raman scattering - Stokes and anti-stokes lines in Raman spectra - Raman frequency - condition for a molecule to be Raman active - Comparison of Raman and IR spectra. Applications of Raman spectroscopy.		
Unit - IV	**NMR spectroscopy**	Periods	6
	Nuclear spin and conditions for a molecule to give rise to NMR spectrum- Theory of NMR spectra-Instrumentation- chemical shift, Number of NMR signals - shielding, de-shielding, Factors influencing chemical shift. TMS & its applications, peak area and number of protons -splitting of signals-spin-spin coupling.		
Unit - V	**Mass spectroscopy**	Periods	6
	Basic Principles - Instrumentation - Molecular ion peak, metastable peak, base peak and isotopic peak - their uses- Nitrogen rule-Ring rule-Fragmentation of alkanes, alkenes, cycloalkane and alcohol - McLafferty rearrangement- Applications of Mass spectroscopy.		
Total Periods			30

Text Books	
1	C. Anand, Instrumental methods of chemical analysis, Himalaya Publishing, 1980.
2	Y.R.Sharma, Elementary Organic Absorption Spectroscopy-principles and chemical applications, S.Chand and Co., 2006.
3	K.V. Raman, R. Gopalan and P.S. Ragavan, Molecular spectroscopy, K.V. Raman, R. Gopalan and P.S. Ragavan Thomson Publications, 2004.
References	
1	C.N. Banwell, Mc Cash and M. Elaine, Fundamentals of Molecular Spectroscopy, Tata Mc.Graw Hill Publishing, New Delhi, 1994.
2	J. Mohan, Organic Analytical Chemistry, Narosa Publishers, 2003.
3	W. Kemp, Organic Spectroscopy, 3rd Edition, Palgrave publishers, 2007.
4	R.M.Silverstein, F.X.Webster, D.J. Kiemle, D.L. Bryce, Spectrometric Identification of Organic compounds, 8th Edition, 2015.
5	G. Aruldhas, Molecular Structure and Spectroscopy, PHI Learning Pvt. Ltd., 2004.
E-References	
1	https://nptel.ac.in/courses/122101001/downloads/lec-13.pdf
2	https://en.wikipedia.org/wiki/Rotational_spectroscopy
3	https://nptel.ac.in/courses/102103044/pdf/mod2.pdf
4	www.mssl.ucl.ac.uk/~gbr/workshop3/papers/Paerels_school_Mar17.pdf

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	**B.Sc**	Programme Code	**UCH**			Regulations	**2018-2019**	
Department	**Chemistry**		Semester				**6**	
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
18U6CHCO8	**CORE PAPER-VIII: ORGANIC CHEMISTRY-II**		5			5	25	75	100
Course Objectives	1. To gain knowledge about fats, oils and waxes. 2. To understand the properties and structure of alkaloids and terpenoids. 3. Acquire the knowledge about steroids, amino acids, proteins and carbohydrates.							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.							
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.							
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.							
PO 4	Apply one's learning to real life situations.							
PO 5	Analyse and synthesise data from a variety of sources.							
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.							
PO 11	Ability to work independently, identify appropriate resources required for a project.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.							
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.							
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.							
PO 15	Ability to acquire knowledge and skills.							

COs	COURSE OUTCOME
CO 1	To gain an insight into fats, oils, wax and detergents.
CO 2	To gain knowledge about the properties and structure of organic compounds like terpenoids, alkaloids derived from plant materials.
CO 3	To understand the structure of some steroidal hormones and vitamins.
CO 4	To gain an insight into amino acids and its preparation, proteins structure and nucleic acids.
CO 5	To acquire basic knowledge of monosaccharides and disaccharides.
Pre-requisites	

KNOWLEDGE LEVELS

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

Cos	KLs	POs	KLs
CO 1	2	PO 1	3
		PO 2	4
		PO 3	6
CO 2	3	PO 4	1
		PO 5	3
		PO 6	2
CO 3	1	PO 7	4
		PO 8	5
		PO 9	3
CO 4	4	PO 10	1
		PO 11	4
		PO 12	2
CO 5	5	PO 13	6
		PO 14	2
		PO 15	4

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**Programme Outcome (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	1	1	2	2	3	1	1	2	2	1	3	1	3	1
CO2	3	2	1	1	3	2	2	1	3	1	2	2	1	2	2
CO3	1	1	1	3	1	2	1	1	1	3	1	2	1	2	1
CO4	2	3	1	1	2	1	1	2	2	1	3	1	1	1	3
CO5	1	2	2	1	1	1	2	3	1	1	2	1	2	1	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Fats, Oils and Wax**	Periods	12
	Occurrence, properties - hydrogenation - drying of oils - hydrogenolysis - rancidity - analysis of oils and fats: saponification value and iodine number - synthetic detergents: cationic, anionic and non-ionic detergents - occurrence of wax - difference between wax and lipids - compound lipids: phospholipids, Sphingolipids and glycolipids.		
Unit - II	**Terpenoids and Alkaloids**	Periods	12
	Terpenoids and alkaloids- Occurrence - Terpenes: General methods of determination of structure of alkaloids are added. Definition - general properties- classification and isolation - isoprene rule - structural elucidation of citral, geraniol and menthol. Alkaloids: Definition - general properties - classification - isolation - structure determination of conine, piperine, nicotine.		
Unit - III	**Steroids, Hormones and Vitamins**	Periods	12
	Steroids: Definition- Cholesterol and Ergosterol (structure only) - Steroidal harmones: Androsterones, Testrosterone, Progestrone and Oestrone (structure only) - Vitamins: Water and Fat soluble vitamins - Occurrence and biological importance of thiamine, riboflavin, pyridoxine and ascorbic acid – structural elucidation of pyridoxine and ascorbic acid.		
Unit - IV	**Amino acids, proteins and nucleic acids**	Periods	12
	Amino acids: - classification - essential and non essential amino acids - preparation of α-amino acids- zwitter ion, isoelectric point - Peptides- synthesis of peptide: Bergmann method, Sheehan method – Proteins - primary and secondary structure of proteins - End group analysis - Nucleic acids: Types of nucleic acids and constituents.		
Unit - V	**Carbohydrates**	Periods	12
	Classification - Monosaccharide: Constitution of glucose and fructose - Reactions of glucose and fructose – Mutarotation and its mechanism - Cyclic structure - pyranose and furanose forms - Fischer and Haworth projection of glucose and fructose - Disaccharides: Structure and reactions of maltose and sucrose (Structural elucidation not necessary).		
Total Periods			60

Text Books	
1	I.L.Finar Organic chemistry vol I & II- ELBS, Pearson Education Ltd., 2008
2	O.P. Agarwal- Reactions and Reagents- Krishna prakashan media (p) Ltd., 1975
3	B.S.Bhal and Arun Bhal- A text book of organic chemistry, S. Chand & company Ltd, 1948.
References	
1	K.S. Tewari, and N.K. Vishoni, Organic Chemistry, Vikas Publishing House.l I & II- ELBS, Pearson Education Ltd., 2008
2	P.L.Soni and H.M.Chawla. Text book of organic chemistry, 26th revised edition, Sultan chand and sons, 1995
3	R.T. Morrison and Boyd, Organic Chemistry, VIth edition., PHI Learning Pvt Ltd., 2008.
4	Modern Organic Chemistry, M. K. Jain and S. C. Sharma, Vishal Publishing Co. 2018
5	Organic Chemistry, Bhupinder Mehta and Manju Mehta, PHI learning Publishers.
E-References	
1	https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Map%3A_Organic_Chemistry_(McMurry)/27%3A_Biomolecules Lipids/27.03%3A_Waxes%2C_Fats%2C_and_Oils.
2	https://www.britannica.com/science/alkaloid
3	https://chem.libretexts.org/Bookshelves/Biological_Chemistry/Supplemental_Modules_(Biological_Chemistry)/Lipids/Steroids
4	https://www.thoughtco.com/amino-acid-373556
5	https://microbenotes.com/carbohydrates-structure-properties-classification-and-functions

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	**B.Sc**	Programme Code	**UCH**			Regulations	**2018-2019**	
Department	**Chemistry**		Semester				**6**	
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
18U6CHCO9	**CORE PAPER-IX: INORGANIC CHEMISTRY-II**		5			5	25	75	100
Course Objectives	1. To study the structure of some crystals. 2. To gain knowledge of some important electron deficient compounds. 3. Acquire the knowledge about coordination chemistry and organo-metallic compounds.							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.							
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.							
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.							
PO 4	Apply one's learning to real life situations.							
PO 5	Analyse and synthesise data from a variety of sources.							
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.							
PO 11	Ability to work independently, identify appropriate resources required for a project.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.							
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.							
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.							
PO 15	Ability to acquire knowledge and skills.							

COs	COURSE OUTCOME
CO 1	Students gain knowledge about the geometry of crystals and its significance
CO 2	Students capable to recognize the inter halogens and pseudo halogens.
CO 3	Students improved their understanding towards preparation of some electron deficient compounds.
CO 4	Students become skilled at the importance of coordination chemistry.
CO 5	Students can identify and understanding the structures of some organo-metallic compounds
Pre-requisites	

KNOWLEDGE LEVELS

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

Cos	KLs	POs	KLs
CO 1	1	PO 1	1
		PO 2	3
		PO 3	2
CO 2	2	PO 4	4
		PO 5	6
		PO 6	2
CO 3	2	PO 7	4
		PO 8	3
		PO 9	4
CO 4	3	PO 10	5
		PO 11	3
		PO 12	2
CO 5	4	PO 13	1
		PO 14	4
		PO 15	5

CO / PO Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**Programme Outcome (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	1	2	1	1	2	1	1	1	1	1	2	3	1	1
CO2	2	2	3	1	1	3	1	2	1	1	2	3	2	1	1
CO3	2	2	3	1	1	3	1	2	1	1	2	3	2	1	1
CO4	1	3	2	2	1	2	2	3	2	1	3	2	1	2	1
CO5	1	2	1	3	1	1	1	2	3	2	2	1	1	3	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Solid State Chemistry**	Periods	12
	Crystalline and Amorphous solids - Differences - Symmetry in crystals - Basic crystal systems - Space lattice and unit cell - Bravais lattices-CCP, FCP, BCP, Packing efficiency - Miller indices - Types of crystals - Radius ratio rule and its applications - Structure of Sodium Chloride, Cesium Chloride, Zinc blende and Wurtzite. Defects in ionic crystals: Schottky, Frenkel, Metal excess and metal deficiency defects.		
Unit - II	**Inter Halogens and Pseudohalogens**	Periods	12
	Definition - similarities and dissimilarities between halogen and pseudohalogen - preparation, properties, structure and uses of cyanogen and thiocyanogen - Naming of the interhalogens - types, preparation, properties, structure and uses of ICl, BrF_3, IF_5, and IF_7. Basic properties of iodine.		
Unit - III	**Electron Deficient Compounds**	Periods	12
	Definition - Borides: structure, properties and uses - Boranes: Diborane - preparation, properties and uses - bonding in boranes - B_2H_6, B_4H_{10} - Carboranes – Wade's rule - compounds of boron with nitrogen: preparation, properties and uses - Borazine-preparation, properties and uses.		
Unit - IV	**Coordination Chemistry-III**	Periods	12
	Stability of complexes - Thermodynamic and kinetic stability - stepwise and overall stability constant - Factors affecting the stability of complexes. Ligand substitution reactions in square planar complexes: The trans effect - Trans effect series - uses of trans effect - theories of trans effect - electrostatic polarization theory - π- bonding theory - mechanism of substitution reactions - factors affecting the rates of substitution reactions in square planar complexes.		
Unit - V	**Organometallic Compounds**	Periods	12
	Organometallic compounds: Definition - Classification based on nature of C-M bond: Ionic, σ bonded and non classically bonded. Organometallic compounds of Lithium, Magnesium and Boron - preparation, properties, structure and uses. Olefin complexes – Zeise's salt - synthesis and structure Cyclopentadienyl complexes - Ferrocene-preparation, properties, bonding and uses.		
Total Periods			60

Text Books	
1	Puri, Sharma, Kalia, Principles of Inorganic Chemistry 32nd Edition (2014), Milestone Publishers and Distributor, New Delhi.
2	W.U. Malik, G. D. Tuli, R. D. Madan, Selected topics in Inorganic Chemistry, S.Chand & company, New Delhi.
3	R.D. Madan, Satyaprakash's Modern Inorganic Chemistry, S. Chand Publishing, New Delhi.
References	
1	S. Prakash, G.D. Tuli, S.K. Basu and R.D. Madan, Advanced Inorganic Chemistry - Vol – I (2006), S. Chand Publishing, New Delhi.
2	S. Prakash, G.D. Tuli, S.K. Basu and R.D. Madan, Advanced Inorganic Chemistry-Vol – II (2006), S. Chand Publishing, New Delhi.
E-References	
1	https://chem.libretexts.org/
2	https://www.toppr.com/guides/chemistry/the-p-block-elements/interhalogen- compounds/
3	http://chem.yonsei.ac.kr/chem/upload/CHE3103-01/119484463779670.pdf

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	**B.Sc**	Programme Code	**UCH**			Regulations	**2018-2019**	
Department	**Chemistry**		Semester				**6**	
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
18U6CHC10	**CORE PAPER-X: PHYSICAL CHEMISTRY-II**		5			5	25	75	100
Course Objectives	1. To encourage the students to study about the different phases of compounds. 2. To acquire the knowledge on the fundamental concepts of electrochemistry. 3. To understand the principle of radiative and non-radiative transitions in photochemistry.							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.							
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.							
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.							
PO 4	Apply one's learning to real life situations.							
PO 5	Analyse and synthesise data from a variety of sources.							
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.							
PO 11	Ability to work independently, identify appropriate resources required for a project.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.							
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.							
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.							
PO 15	Ability to acquire knowledge and skills.							

COs	COURSE OUTCOME
CO 1	Students will identify the formation of metal alloy systems.
CO 2	Students can demonstrate the processes in electrochemistry and method of determinations in conductometric titrations.
CO 3	Students understand the formation and dissociation of acids, bases and salts.
CO 4	Students learn about the various types of cells and electrodes.
CO 5	Students analyze and apply the different laws of photochemical reactions.
Pre-requisites	

KNOWLEDGE LEVELS

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

Cos	KLs	POs	KLs
CO 1	2	PO 1	2
		PO 2	4
		PO 3	1
CO 2	1	PO 4	3
		PO 5	5
		PO 6	2
CO 3	4	PO 7	4
		PO 8	5
		PO 9	3
CO 4	5	PO 10	1
		PO 11	2
		PO 12	4
CO 5	3	PO 13	3
		PO 14	5
		PO 15	4

CO / PO Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**Programme Outcome (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	1	2	2	1	3	1	1	2	2	3	1	2	1	1
CO2	2	1	3	1	1	2	1	1	1	3	2	1	1	1	1
CO3	1	3	1	2	2	1	1	2	2	1	1	3	2	2	3
CO4	1	2	1	1	3	1	2	3	1	1	1	2	1	3	2
CO5	2	2	1	3	1	2	2	1	3	1	2	2	3	1	2

Course Assessment Methods			
Direct			
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations			
Indirect			
1. Course End Delivery			
Content of the Syllabus			
Unit - I	**Phase Rule**	Periods	12
	Statement, explanation of terms involved in phase rule, derivation of phase rule. One component system – water, sulphur and CO_2 systems - two component system - solid - liquid equilibria - CST Lower and upper systems - simple eutectic system - Ag- Pb and KI-H_2O systems. Compound formation with congruent melting points - $FeCl_3$-H_2O and Zn-Mg and compound formation with incongruent melting points - K-Na alloy system.		
Unit - II	**Electrochemistry – I**	Periods	12
	Faraday's laws, Ohm's law, Electrolytic conductance - specific conductance - equivalent conductance - molar conductance - variation of molar conductance and equivalent conductance with dilution. Transport number - Determination of transport number by Hittorf's method and moving boundary method. Ionic mobilities - definition and determination – Walden's rule. Kohlrausch's law - applications. Conductometric titrations - Principle, types - strong acid vs strong base, weak acid vs strong base. Advantages of conductometric titrations.		
Unit - III	**Electrochemistry – II**	Periods	12
	Debye - Huckel Theory - Ionic atmosphere - dissociation of weak acids and bases - Ionic product of water - common ion effect and its applications. pH and its determination - Hydrolysis of different types of salts - determination of degree of hydrolysis - electrical conductance method (Bredig's method). Buffer solution - pH of Buffer solution - Henderson - Hasselbalch equation. Solubility product - relation between solubility product and molar solubility - Applications of solubility product.		
Unit - IV	**Electrochemistry – III**	Periods	12
	Standard cell - single electrode potential - Types of electrode - Standard Hydrogen electrode and calomel electrode - Quinhydrone electrode and glass electrode - EMF - measurements (Poggendorff's method) - Standard emf - emf series - applications. Electrochemical cells - Galvanic cell. Cell reaction and half cell reaction - cell representation. Reversible and Irreversible cells. Concentration cell with and without transference. Polarization and overvoltage. Potentiometric titration - principle, acid-base and redox titrations.		
Unit - V	**Photochemistry**	Periods	12
	Electromagnetic radiation - difference between thermal and photochemical processes. Laws of photochemistry - Beer-Lambert's Law, Grothus - Draper law, Stark-Einstein law. The Jablonski diagram depicting various photo physical processes occurring in the excited state - Radiative (Fluorescence and Phosphorescence) and non-radiative (Internal Conversion and Inter system crossing) processes. Quantum yield - Definition, determination - Spectroscopic method and Agnometric method - law of photochemical equivalence. Photochemical reactions - Kinetics of hydrogen - bromine reaction - decomposition of HI.		
Total Periods			60

Text Books	
1	A. Bahl, B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry, Revised multicolor edition, S. Chand publication Ltd, New Delhi, 2010.
2	B.R . Puri , L.R.Sharma., M.S.Pathania., Principles of Physical Chemistry, (47th edition) Vishal Publishing Co., New Delhi, 2017.
3	D.R. Crow, Principles and Applications of Electrochemistry, 4th Edition, CRC Taylor and Francis Group, 1994.
4	K.K. Rohatgi-Mukherjee, Fundamentals of Photochemistry, Revised edition, New Age International Pvt. Ltd, New Delhi, 2003.
References	
1	G. Raj, Advanced Physical Chemistry, Krishna Prakashan Media Pvt. Ltd, 35th edition, 2009.
2	P. Atkins and J. D. Paula, Physical Chemistry, 7th Edn, Oxford University Press, New York, 2002.
3	M.S. Yadhav, Electrochemistry, Anmol Publications Pvt Ltd, Revised Edition, 2001.
E-References	
1	soft-matter.seas.harvard.edu/index.php
2	https://latestcontents.com/chemistry
3	https://hemantmore.org.in/science/chemistry
4	https://www.edinst.com
5	https://chem.libretexts.org/Jablonski_diagram

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.						
Programme	**B.Sc**	Programme Code	**UCH**		Regulations	**2018-2019**	
Department	**Chemistry**		Semester			**6**	
Course Code	Course Name	Periods per Week			Credit	Maximum Marks	
		L	T	P	C	CA	ESE	Total
18U6CHEO2	**ELECTIVE COURSE - II MEDICINAL CHEMISTRY**	4			3	25	75	100
Course Objectives	1. To help the student to understand the basic concepts in medicinal chemistry and to develop their critical thinking. 2. To learn the basics and applications of the chemical compounds as drugs in pharmaceutical industry. 3. To understand the importance of the constituents of blood and cancer chemotherapy.						
POs	**PROGRAMME OUTCOME**						
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.						
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.						
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.						
PO 4	Apply one's learning to real life situations.						
PO 5	Analyse and synthesise data from a variety of sources.						
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.						
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.						
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.						
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.						
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.						
PO 11	Ability to work independently, identify appropriate resources required for a project.						
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.						
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.						
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.						
PO 15	Ability to acquire knowledge and skills.						

COs	COURSE OUTCOME
CO 1	Students will learn the basic principles of chemistry involved in life sciences.
CO 2	Students will have basic understanding on cancer chemotherapy and haemetology.
CO 3	Students will be able to incorporate the causes of various diseases and proper usage of medicines.
CO 4	Students will be able to know the different types of drugs being used in drug industry.
CO 5	Students will be able to know the different types of drugs being used in drug industry.
Pre-requisites	

KNOWLEDGE LEVELS			
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing			
CO / PO / KL Mapping **(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)**			
Cos	KLs	POs	KLs
CO 1	2	PO 1	2
		PO 2	1
		PO 3	4
CO 2	1	PO 4	3
		PO 5	5
		PO 6	2
CO 3	4	PO 7	4
		PO 8	6
		PO 9	4
CO 4	5	PO 10	2
		PO 11	3
		PO 12	4
CO 5	3	PO 13	5
		PO 14	1
		PO 15	3

CO / PO Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**Programme Outcome (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	2	1	3	1	1	1	3	2	1	1	2	2
CO2	2	3	1	1	1	2	1	1	1	2	1	1	1	3	1
CO3	1	1	3	2	2	1	1	1	3	1	2	3	2	1	2
CO4	1	1	2	1	3	1	2	2	2	1	1	2	3	1	1
CO5	2	1	2	3	1	2	2	1	2	2	3	2	1	1	3

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Study of Drugs**	Periods	12
	Definition of the terms - Drug, Pharmacophore, Pharmacodynamics, Pharmacopoeia, pharmacology, pharmacokinetics, Bacteria, Virus, Fungus, Actinomycetes, Metabolites, Metabolism of drug, Antimetabolites, LD_{50}, ED_{50}. Classification of drugs, Assay of drugs - Specific methods.		
Unit - II	**Antibiotics**	Periods	12
	Antibiotics - definition - classification as broad and narrow spectrum antibiotics. Structure, properties, mode of action and uses of penicillin, chloramphenicol, streptomycin, tetracycline, novobiocin and puromycin.		
Unit - III	**Sulphonamides**	Periods	12
	Sulphonamides - preparation, properties and uses of sulphanilamides - mechanism and action of sulpha drugs - preparation, properties and uses of sulphadiazine, sulphapyridine, prontosil and sulphathiazole.		
Unit - IV	**Blood and Haematological Agents**	Periods	12
	Blood - composition of blood - pH of blood -blood Serum - blood grouping and matching – physiological function of plasma protein - role of blood as oxygen carrier with haemoglobin- cytochrome. Blood pressure, hypertension, clotting of blood and haemotological agents.		
Unit - V	**Cancer Chemotherapy**	Periods	12
	Types of neoplasms - Sarcoma, Carcinoma, Carcinosarcoma, Teratoma, Leukemia and Polycythemia. Causes of cancer through virus and chemicals. Treatment of cancer by surgery, radiation therapy and medical therapy. Cytotoxic anticancer drugs - alkylating agents - Bis-chloroethylamines, Cyclophosphamide, Mechlorethamine, Ethyleneimines, Alkyl Sulfonates, Nitrosoureas - Miscellaneous alkylating agents - Mode of action of Alkylating agents.		
Total Periods			60

Text Books	
1	S. Lakshmi, Pharmaceutical Chemistry, S.Chand & Sons, New Delhi,2004.
2	V.K. Ahluwalia and Madhu Chopra, Medicinal Chemistry , Ane Books,New Delhi, Reprint 2009.
References	
1	G. Patrick, Medicinal Chemistry, VIVA Books Private Ltd, New Delhi, 2002
2	R.R. Nadendla , Principles of Organic Medicinal Chemistry New Age International Private Ltd Publishers, New Delhi Reprint 2007.
3	P. Parimoo, A Text Book of Medicinal Chemistry, CBS Publishers, New Delhi,2006.
E-References	
1	https://pharmafactz.com/introduction-to-medicinal-chemistry/
2	https://en.wikipedia.org/wiki/Medicinal_chemistry
3	http://library.umac.mo/ebooks/b28050332.pdf

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.						
Programme	**B.Sc**	Programme Code	**UCH**		Regulations	**2018-2019**	
Department	**Chemistry**		Semester			**6**	
Course Code	Course Name	Periods per Week			Credit	Maximum Marks	
		L	T	P	C	CA	ESE	Total
18U6CHS02	**SKILL BASED ELECTIVE COURSE - II POLYMER CHEMISTRY**	2			2	25	75	100
Course Objectives	1. To impart the students the knowledge of polymer materials, their formation mechanisms, properties and uses. 2. To learn basic concepts of polymer chain architecture, structure and morphology, with particular emphasis on the relationship between chemical structure (chain architecture). 3. To impart the students the understanding of biological applications of polymer materials.							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.							
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.							
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.							
PO 4	Apply one's learning to real life situations.							
PO 5	Analyse and synthesise data from a variety of sources.							
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.							
PO 11	Ability to work independently, identify appropriate resources required for a project.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.							
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.							
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.							
PO 15	Ability to acquire knowledge and skills.							

COs	COURSE OUTCOME
CO 1	Students will be able to gain knowledge about the properties and classification of polymers.
CO 2	Students will be able to prepare of polymer through different techniques of polymerization.
CO 3	Students will be able to estimate the number- and weight-average molecular masses of polymers given the degree of polymerization and mass fraction of chains present.
CO 4	Students will develop their knowledge towards degradation of polymerization.
CO 5	Students will enhance their knowledge towards the commercially important polymers, their preparation and applications.
Pre-requisites	

KNOWLEDGE LEVELS

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

Cos	KLs	POs	KLs
CO 1	3	PO 1	4
		PO 2	2
		PO 3	1
CO 2	2	PO 4	3
		PO 5	6
		PO 6	4
CO 3	4	PO 7	2
		PO 8	5
		PO 9	2
CO 4	1	PO 10	4
		PO 11	1
		PO 12	3
CO 5	3	PO 13	4
		PO 14	2
		PO 15	4

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	2	1	3	1	2	2	1	2	2	1	3	2	2	2
CO2	1	3	2	2	1	1	1	1	3	1	2	2	1	3	1
CO3	3	1	1	2	1	3	1	2	1	3	1	2	3	1	3
CO4	1	2	3	1	1	1	2	1	2	1	3	1	1	2	1
CO5	2	2	1	3	1	2	2	1	2	2	1	3	2	2	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	**Polymers Classification and properties**	Periods	6
	Monomers, Oligomers and Polymers - Degree of polymerization and its significance- Funtionality - Tacticity of Polymers (Isotactic, Syndiotactic and Atactic). Nomenclature of polymers- Homopolymers and Co-polymers. Classification of polymers - Natural, Synthetic, Organic and Inorganic Polymers - linear, cross linked and network. Physical properties of polymers - Elasticity, Tensile strength, Glass Transition Temperature.		
Unit - II	**Techniques and Mechanism of Polymerisation**	Periods	6
	General methods of preparation of polymer-Bulk, Solution, Suspension and Emulsion polymerization. Mechanism of polymerization- Cationic, anionic, free radical and Coordination polymerization. Types of Polymerization - Condensation and Addition Polymerization. Plastics-Thermoplastic and Thermosetting Plastics.		
Unit - III	**Molecular weight and its Determination**	Periods	6
	Molecular weight and its determination: concept of Molecular weight-Number average Molecular weight-Weight average molecular weight. Methods of determining molecular weight- Osmometry, Viscometry and sedimentation, Gel permeation Chromatography.		
Unit - IV	**Polymer degradation and Compounding materials of polymers**	Periods	6
	Polymer degradation-Definition- Types of degradation- Thermal degradation - Mechanical degradation, Hydrolytic degradation, Photodegradation and Biodegradation. Compounding Materials of Polymers – Plastics – Fillers – Plasticizers – Colorants – Antioxidants - Stabilizers and Lubricants and Differences.		
Unit - V	**Industrially important polymers**	Periods	6
	Individual Polymers-Polyacrylates, Polystyrene, Polyethylene, Polyvinylchloride, Polyester, Polyamides- (Nylon-6, Nylon 6,6), Kevlar-Preparation and Uses. Types of Rubber - Natural Rubber and synthetic process - Vulcanization. Fibre Reinforced Plastic (FRP) - Foamed Plastics-Conducting Polymers, polymers in biological application.		
Total Periods			30

Text Books	
1	V.R. Gowarikar., N.V. Viswanathan: Polymer Science-Wiley Eastem limited,New Delhi.1986.
2	F.W. Billmeyer,Wiley, Textbook of Polymer Science, 1984.
3	M.S.Bhatnagar, A Text Book Polymers, S.Chand & Company Ltd, Ram Nagar, New Delhi. Volume-II-2004.

References	
E-References	
1	https://byjus.com/jee/polymers/
2	https://www.intechopen.com/books/fiber-reinforced-polymers-the-technology-applied-for-concrete-repair/introduction-of-fibre-reinforced-polymers-polymers-and-composites-concepts-properties-and-processes

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	**B.Sc**	Programme Code	**UCH**			Regulations	**2018-2019**	
Department	**Chemistry**		Semester				**6**	
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
18U6CHCP03	**CORE PRACTICAL - III: PHYSICAL CHEMISTRY PRACTICAL**				3	4	40	60	100
Course Objectives	1. To verify the some important principles in physical chemistry. 2. To determine various physical properties using simple instruments like conductivity meter, potentiometer, etc.							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.							
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.							
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.							
PO 4	Apply one's learning to real life situations.							
PO 5	Analyse and synthesise data from a variety of sources.							
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.							
PO 11	Ability to work independently, identify appropriate resources required for a project.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.							
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.							
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.							
PO 15	Ability to acquire knowledge and skills.							

COs	COURSE OUTCOME
CO 1	To develop skills in doing experiments in kinetics, Potentiometry and phase rule.
CO 2	Students will gain an understanding of how to keep records of instruments, parameters.
CO 3	Students will gain experimental observations.
CO 4	Students will get various physical properties using simple instruments.
CO 5	Enable the students to work effectively as a member of a team and to Communicate productively with lab mates, teaching assistant and instructor.
Pre-requisites	

KNOWLEDGE LEVELS			
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing			
CO / PO / KL Mapping **(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)**			
Cos	KLs	POs	KLs
CO 1	2	PO 1	2
		PO 2	3
		PO 3	4
CO 2	4	PO 4	5
		PO 5	1
		PO 6	6
CO 3	1	PO 7	2
		PO 8	3
		PO 9	3
CO 4	1	PO 10	2
		PO 11	4
		PO 12	3
CO 5	3	PO 13	2
		PO 14	4
		PO 15	1

CO / PO Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**Programme Outcome (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	2	1	1	2	2	3	1	2	3	1	2
CO2	1	2	3	2	1	1	1	2	2	1	3	2	1	3	1
CO3	2	1	1	1	3	1	2	1	1	2	1	1	2	1	3
CO4	2	1	1	1	3	1	2	1	1	2	1	1	2	1	3
CO5	2	3	2	1	1	1	2	3	3	2	2	3	2	2	1

Course Assessment Methods			
Direct			
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations			
Indirect			
1. Course End Delivery			
Content of the Syllabus			
Unit - I	**Kinetics**	Periods	12
	1. Rate constant determination for first order reaction-Hydrolysis of an ester in acidic medium (Ethyl acetate or Methyl acetate). 2. Rate constant determination for second order reaction-Reaction between Potassium persulphate and Potassium iodide.		
Unit - II	**Conductivity Experiments -I**	Periods	12
	1. Determination of cell constant. 2. Determination of dissociation constant for weak acid (Acetic acid). 3. Determination of Equivalent conductance at infinite dilution for strong electrolyte (KCl).		
Unit - III	**Conductivity Experiments-II**	Periods	12
	1.Conductometric titration-Strong acid vs Strong base, 2.Weak acid vs Strong base. 3. Precipitation titration – KCl vs $AgNO_3$		
Unit - IV	**Potentiometry**	Periods	12
	1. Potentiometric titration- Strong acid vs Strong base, 2. Weak acid vs Strong base. 3. Precipitation titration – KCl vs $AgNO_3$		
Unit - V	**Heterogeneous Equilibrium**	Periods	12
	1. Binary system-naphthalene/biphenyl, 2. Phenol/water system-determination of CST and study of effect of impurity (NaCl) on CST. 3. Determination of transition temperature for hydrated salts-sodium thiosulphate, sodium acetate, strontium chloride, manganous chloride. 4. Determination of K_f of a solvent by Rast method.		
Total Periods			60

Text Books	
1	Basic Principle of Practical chemistry - V. Venkateswaran, R. Veeraswamy and A.R. Kulandaivelu, S. Chand and Sons, New Delhi, 2004.
References	
1	Experimental Physical Chemistry, V.D. Athawale, Parulmathur, New age International publishers, 2001.
E-References	
1	https://pubs.acs.org/doi/abs/10.1021/ed013p250.2
2	https://www.elsevier.com/books/experiments-in-physical-chemistry/wilson/ 978-0-08-023798-5

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	**B.Sc**	Programme Code	**UCH**			Regulations	**2018-2019**	
Department	**Chemistry**		Semester				**6**	
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
18U6CHCP04	**CORE PRACTICAL- IV** **ORGANIC ANALYSIS, PREPARATIONS AND GRAVIMETRIC ESTIMATIONS**				5	5	25	75	100
Course Objectives	1. The students will get training in the quantitative analysis of metal ions using gravimetric method. 2. The students will get training for systematic qualitative analysis and preparation of simple organic compounds.							
POs	**PROGRAMME OUTCOME**							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.							
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.							
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.							
PO 4	Apply one's learning to real life situations.							
PO 5	Analyse and synthesise data from a variety of sources.							
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.							
PO 11	Ability to work independently, identify appropriate resources required for a project.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.							
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.							
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.							
PO 15	Ability to acquire knowledge and skills.							

COs	COURSE OUTCOME
CO 1	Students will learn to predict the outcome of organic reactions.
CO 2	To understanding of the general reactivity of functional groups and mechanism.
CO 3	Enable the students to work effectively as a member of a team.
CO 4	To Communicate productively with lab mates, teaching assistant and instructor.
CO 5	Students will learn to maintain a detailed scientific notebook.
Pre-requisites	

KNOWLEDGE LEVELS

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

Cos	KLs	POs	KLs
CO 1	2	PO 1	3
		PO 2	1
		PO 3	4
CO 2	1	PO 4	2
		PO 5	6
		PO 6	2
CO 3	3	PO 7	3
		PO 8	4
		PO 9	2
CO 4	5	PO 10	4
		PO 11	2
		PO 12	4
CO 5	4	PO 13	3
		PO 14	4
		PO 15	2

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	**Programme Outcome (POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	1	1	3	1	1	1	1	3	2	1	1	2	2	1
CO2	2	3	1	1	2	3	1	3	1	2	2	2	2	2	1
CO3	3	2	1	2	1	2	1	2	2	3	1	1	3	3	1
CO4	1	2	2	1	3	2	1	2	1	1	3	3	1	1	2
CO5	1	1	3	1	2	1	2	1	1	1	2	2	1	1	3

Course Assessment Methods			
Direct			
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations			
Indirect			
1. Course End Delivery			
Content of the Syllabus			
Unit – I	**Organic Qualitative analysis-I**	Periods	15
	Analysis of Organic Compounds Characterization of organic compounds by their functional group and confirmation by preparation of derivatives. The following functional groups may be studies: Carboxylic Acids (mono and di), Phenols, Aromatic Esters, and Aldehydes.		
Unit – II	**Organic Qualitative analysis-II**	Periods	15
	Analysis of Organic Compounds Characterization of organic compounds by their functional group and confirmation by preparation of derivatives. Ketones, Monosaccharides, Amides, Diamides, Aromatic primary amines and Nitro compounds.		
Unit – III	**Organic Preparations - I**	Periods	15
	Preparations involve the following reactions: 1. Oxidation - Preparation of Benzoic acid from Benzaldehyde 2. Hydrolysis - Preparation of Methyl salicylate from Salicylic acid 3. Nitration- Preparation of p - Nitroacetanilide from Acetanilide.		
Unit – IV	**Organic Preparations - II**	Periods	15
	4. Bromination - Preparation of p - Bromoacetanilide from Acetanilide 5. Bromination - Preparation of sym -Tribromophenol from Phenol 6. Benzoylation - Preparation of Benzanilide from aniline.		
Unit – V	**Gravimetric Estimations**	Periods	15
	1. Estimation of Nickel as Nickel DMG Complex 2. Estimation Barium as Barium Chromate 3. Estimation of Lead as Lead Chromate		
Total Periods			75

Text Books	
1	Dr. N.S Gnanapragasam, Organic chemistry Lab manual.
2	V. Venkateswaran, R.Veeraswamy and A.R. Kulandaivelu, Basic Principle of Practical chemistry, S. Chand and Sons, New Delhi, 2004.
References	
1	R.K. Bansal, Laboratory Manual of Organic chemistry, 3rd Edition, New Age Internal Publication.
2	B.S. Furniss, A.J. Hannaford, P.W.D Smith and A.R. Tatchell, Vogel's Practical Organic chemistry, 5th Edition, ELBS (1989).
E-References	
1	https://www.toppr.com/guides/chemistry/organic-chemistry/qualitative-analysisof-organic-compounds/
2	https://www.csub.edu/chemistry/organic/manual/Lab14_QualitativeAnalysis.pdf
3	https://chem.libretexts.org/Ancillary_Materials/Laboratory_Experiments/Wet_Lab _Experiments/General_ Chemistry_Labs/Online_Chemistry_Lab_Manual/Chem_11_ /07%3A_Gravimetric_Analysis_ (Experiment)

Signature of BOS Chairman