

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

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

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

## **DEPARTMENT OF CHEMISTRY**



### **CBCS SYLLABUS**

### **BACHELOR OF SCIENCE**

**PROGRAMME CODE - K**

### **COURSE STRUCTURE**

(w.e.f. 2021 – 2022 Batch onwards)



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

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

Re-accredited (3<sup>rd</sup> Cycle) with Grade A+ & CGPA 3.51 by NAAC





## **CRITERION - I**

*1.1.3 Details of courses offered by the institution that focus on employability / entrepreneurship / skill development during the year.*

Syllabus copies with highlights of contents focusing on  
Employability / Entrepreneurship / Skill Development



**To be Noted:**

<b>HIGHLIGHTED COLORS</b>	<b>COURSES</b>
	<b>Employability</b>
	<b>Skill Development</b>
	<b>Entrepreneurship</b>
	<b>Skilled &amp; Employability</b>

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

(An Autonomous Institution - Affiliated to Madurai Kamaraj University)

(Re-Accredited with (3<sup>rd</sup> cycle) A<sup>+</sup> & CGPA 3.51 Grade by NAAC)**CBCS****DEPARTMENT OF CHEMISTRY-UG**

( w.e.f. 2021 – 2022 onwards)

**COURSE STRUCTURE-SEMESTER WISE**

Sem	Part	Sub. Code	Title of the paper	Teaching hrs (Per week)	exam Duration (hrs)	Marks Allotted			Credits
						CIA	SE	Total	
1	I	211T1	Part I: Tamil	6	3	25	75	100	3
	II	212E1	Part II: English	6	3	25	75	100	3
	III	21K11	Core : Inorganic, Organic and Physical Chemistry-I	4	3	25	75	100	4
			Core : Major Practical – I* Semi micro Inorganic qualitative analysis	2	-	-	-	-	-
		21AM1	Allied I: Mathematics -I	6	3	25	75	100	4
	IV	21SEK11	SBE: Laboratory Techniques	2	3	25	75	100	2
		21SEK12	SBE: Industrial Chemistry	2	3	25	75	100	2
		21NMK1	NME:Dairy Chemistry	2	3	25	75	100	2
	2	I	211T2	Part I: Tamil	6	3	25	75	100
II		212E2	Part II: English	6	3	25	75	100	3
III		21K21	Core: Inorganic, Organic and Physical Chemistry-II	4	3	25	75	100	4
		21K2P	Core: Major Practical – I* * Semi micro Inorganic qualitative analysis	2	3	40	60	100	2
		21AM2	Allied I: Mathematics– II	6	3	25	75	100	5
IV		21SEK21	SBE: Medicinal Chemistry	2	3	25	75	100	2
		21SEK22	SBE: Forensic Chemistry	2	3	25	75	100	2
	21NMK2	NME: Chemistry in Everyday Life	2	3	25	75	100	2	
3		211T3	Part I: Tamil	6	3	25	75	100	3

	II	212E3	Part II: English	6	3	25	75	100	3
	III	21K31	Core: Organic and Inorganic Chemistry	4	3	25	75	100	4
			Core: Major Practical – II* Volumetric analysis	2	-	-	-	-	-
		21AM3	Allied I : Mathematics–III	6	3	25	75	100	4
		21AP1	Allied II : Physics-Mechanics and Properties of Matter and Sound	4	3	25	75	100	4
			Allied II : Physics Practical –I*	2	-	-	-	-	-
4	I	211T4	Part I: Tamil	6	3	25	75	100	3
	II	212E4	Part II: English	6	3	25	75	100	3
	III	21K41	Core: Organic & Physical Chemistry	4	3	25	75	100	4
		21K4P	Core: Major Practical – II* Volumetric analysis	2	3	40	60	100	2
		21AM4	Allied I : Mathematics– IV	6	3	25	75	100	5
		21AP2	Allied II : Physics- Thermal Physics	4	3	25	75	100	4
		21AP2P	Allied II : Physics Practical-I*	2	3	40	60	100	1
5	III	21K51	Core: Organic Chemistry	4	3	25	75	100	4
	III	21K52	Core: Physical Chemistry-I	4	3	25	75	100	4
	III		Core: Elective I	4	3	25	75	100	4
		21K5P	Core: Major Practical – III* Gravimetric Estimation and Organic Preparations	4	6	40	60	100	5
			Core: Major Practical – IV* Physical Chemistry	4	-	-	-	-	-
		21AP3	Allied II : Physics-Electricity & Electronics	4	3	25	75	100	4
			Allied II : Physics Practical-II*	2	-	-	-	-	-
	IV	21SEK51	SBE: Chemistry of bio molecules	2	3	25	75	100	2
	214EV5	Environmental Studies	2	3	25	75	100	2	

6	III	21K61	Core: Organic Chemistry and Spectroscopy	4	3	25	75	100	4
	III	21K62	Core: Physical Chemistry-II	4	3	25	75	100	4
	III		Core : Elective II	4	3	25	75	100	4
		21K61P	Core: Major Practical –IV* Physical Chemistry	4	6	40	60	100	5
		21K62P	Core: Major Practical – V* Organic analysis & Estimation	4	6	40	60	100	5
		21AP4	Allied II : Physics - Optics	4	3	25	75	100	4
		21AP4P	Allied II : Physics Practical-II*	2	3	40	60	100	1
	IV	21SEK61	SBE: Green and Nano Chemistry	2	3	25	75	100	2
		214VE6	Value Education	2	3	25	75	100	2
	V	215NS4/ 215PE4	Extension Activities NSS/ Phy. Education	-	3	25	75	100	1
		Total	180					140	

### Electives

#### Semester V

##### Elective- I- (Choose any one)

1. Inorganic and Analytical Chemistry - 21KE5A
2. Chemistry of materials - 21KE5B

#### Semester VI

##### Elective- II- (Choose any one)

1. Inorganic and applications of computer in chemistry -21KE6A
2. Diffraction Methods and Applications -21KE6B

**E.M.G.YADAVA WOMEN'S COLLEGE, MADURAI -14**  
 (An Autonomous Institution - Affiliated to Madurai Kamaraj University)  
 (Re-Accredited with (3<sup>rd</sup> cycle) A<sup>+</sup> & CGPA 3.51 Grade by NAAC)  
**CBCS**

**DEPARTMENT OF CHEMISTRY-UG**  
 ( w.e.f. 2021 – 2022 Batch onwards)

**ALLIED CHEMISTRY (For B.Sc., N&D)**

**COURSE STRUCTURE - SEMESTER WISE**

Sem	Sub Code	Title of the paper	Teaching hrs. (Per week)	Duration of exam (hrs)	Marks allotted			Credits
					C.A	S.E	Total	
III	21AKN3	General Chemistry -I	4	3	25	75	100	4
		<b>Allied Practical I*</b> – Inorganic Qualitative Analysis	2	-	-	-	-	
IV	21AKN4	General Chemistry -II	4	3	25	75	100	4
	21AKN4P	<b>Allied Practical I*</b> – Inorganic Qualitative Analysis	2	3	40	60	100	1
V	21AKN5	General Chemistry -III	4	3	25	75	100	4
		<b>Allied Practical II*</b> – Volumetric Analysis	2	-	-	-	-	-
VI	21AKN6	General Chemistry -IV	4	3	25	75	100	4
	21AKN6P	<b>Allied Practical II*</b> – Volumetric Analysis	2	3	40	60	100	1

**E.M.G.YADAVA WOMEN'S COLLEGE, MADURAI -14**  
 (An Autonomous Institution - Affiliated to Madurai Kamaraj University)  
 (Re-Accredited with (3<sup>rd</sup> cycle) A<sup>+</sup> & CGPA 3.51 Grade by NAAC)  
**CBCS**

**DEPARTMENT OF CHEMISTRY-UG**  
 ( w.e.f. 2021 – 2022 Batch onwards)

**ALLIED CHEMISTRY (For B.Sc Physics)**

**COURSE STRUCTURE - SEMESTER WISE**

Sem	Sub code	Title of the paper	Teaching hrs. (Per week)	Duration of exam (hrs)	Marks allotted			Credits
					C.A	S.E	Total	
III	21AKP3	Physical Chemistry	4	3	25	75	100	4
		<b>Allied Practical I*</b> –Inorganic Qualitative Analysis	2	-	-	-	-	
IV	21AKP4	Organic and Physical Chemistry	4	3	25	75	100	4
	21AKP4P	<b>Allied Practical I*</b> –Inorganic qualitative Analysis	2	3	40	60	100	1
V	21AKP5	Inorganic, Physical and Medicinal Chemistry	4	3	25	75	100	4
		<b>Allied Practical II*</b> –Volumetric Analysis	2	-	-	-	-	-
VI	21AKP6	Analytical and Inorganic Chemistry	4	3	25	75	100	4
	21AKP6P	<b>Allied Practical II*</b> –Volumetric Analysis	2	3	40	60	100	1

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

(An Autonomous Institution - Affiliated to Madurai Kamaraj University)

(Re-Accredited with (3<sup>rd</sup> cycle) A<sup>+</sup> & CGPA 3.51 Grade by NAAC)**CBCS****DEPARTMENT OF CHEMISTRY-UG**

(w.e.f. 2021 – 2022 onwards)

**Title of the paper: Core- Inorganic, Organic and Physical Chemistry -I****Semester : I****Contact hours: 4****Sub code : 21K11****Credits : 4****Objectives:**

1. To acquire knowledge and understanding of atomic structure and periodic properties, chemical bonding.
2. To gain about fundamental concepts of organic chemistry, reaction mechanism and gaseous state.

**Unit: I ATOMIC STRUCTURE AND PERIODIC PROPERTIES:** Atomic structure: Pauli exclusion principle, Hund's rule, Aufbau principle and electronic configurations of elements – stability of half filled and completely filled orbital – shapes of orbitals, s, p, d and f block elements – classification and characteristic properties. Periodic properties: covalent radius- periodic trends in covalent radii; ionic radius- periodic trends in ionic radii; ionization energy, electron affinity- factors affecting ionization energy, electron affinity- factors affecting electron affinity, electro negativity-scales of electronegativity- Pauling's scale and Mulliken's scale- factors determining electro negativity, applications of electro negativity.

**Unit: II CHEMICAL BONDING:** Ionic bond-general properties of ionic compounds - lattice energy-Born-Lande equation-Born-Haber cycle- covalent bond-general properties of covalent compounds-Fajan's rule-Valence bond theory- orbital overlap-hybridization-  $sp^3, sp^2, sp$  -sigma and pi bonds-VSEPR theory-postulates- geometries of  $BF_3, CH_4, H_2O, NH_3, PCl_5, SF_6, IF_7$  molecules. Molecular orbital theory: Linear combination of atomic



orbitals-bonding and antibonding molecular orbitals-Bond order- MO diagram of molecules like  $H_2$ ,  $He_2$ ,  $O_2$ ,  $F_2$ ,  $NO$  and  $CO$ - Comparison between VBT and MOT.

**Unit: III FUNDAMENTALS OF ORGANIC CHEMISTRY:** Introduction–IUPAC series- homologous series- functional groups. Electron displacement effect: Inductive effect, electromeric effect, resonance. Breaking of C-C bond: Homolytic and heterolytic cleavage. Reaction intermediate –formation and stability of carbocation, carbanion and free radical. Hyperconjugation - attacking reagents – nucleophiles and electrophiles.

**Unit: IV REACTION MECHANISM:** Types of reaction and their mechanism: substitution reaction- mechanism of  $S_N1$ ,  $S_N2$  and  $S_Ni$  reactions – elimination reactions- mechanism of  $E1$  and  $E2$ ,  $Ei$  reactions. Addition reaction-electrophilic and nucleophilic, polymerisation reaction-addition and condensation polymerization, Rearrangement reaction - intra and inter molecular rearrangement - reaction mechanism determination: product analysis, isotopic labeling.

**Unit: V GASEOUS STATE:** Ideal gases: Kinetic theory of ideal gases - gas laws (no derivation) – Maxwell distribution of molecular velocities (no derivation)-Definition of Most probable velocity, Average velocity, RMS velocity - Collision number- collision frequency -Mean free path. Real gases: Deviation from ideal behaviour - Derivation of Vanderwaal's equation – inter molecular forces-Types (dipole-dipole, dipole-induced dipole and induced dipole-induced dipole interaction)-Methods of liquefaction of gases - Joule Thomson effect - Inversion temperature (Definition only).

**Text Books:**

1. Bahl B.S. Tuli G.D. & Arun Bahl, “*Essentials of Physical Chemistry*,” S. Chand & Company Ltd., New Delhi, 2004.
2. Jain M.K. Sharma S.C., “*Modern Organic Chemistry*”, Vishal Publishing Co., Jalandhar, 2009.
3. Puri, Sharma & Kalia, “*Principles of Inorganic Chemistry*”, Vishal Publishing Co., 2017.

4. Puri B.R., Sharma L.R. & Madan S.Pathania, "*Principles of Physical Chemistry*", Vallabha Publications, Jalandhar, 2009.

**Reference Books:**

1. Finar I. L., "*Organic Chemistry*" Volume I, Pearson Education (Singapore) Pvt. Ltd, Indian Branch, Delhi, 2011.
2. Lee J.D. "*Concise Inorganic Chemistry*", 5<sup>th</sup> edition, Wiley's India, 2008.
3. Morrison R.T. & Boyd R.N., "*Organic Chemistry*", 7<sup>th</sup> Edition, Dorling Kindersley (India) Pvt. Ltd., New Delhi, 2011.
4. Soni P.L. & Dharmarha O.P., "*Text Book of Physical Chemistry*", Sultan Chand & Sons, New Delhi, 2001.
5. Tewari K.S., Vishnoi N. K. & Mehotra S.N., "*A Text Book of Organic Chemistry*", 1st Edition, Vikas Publishing House Pvt. Ltd., New Delhi, 2001.

**E.M.G.YADAVA WOMEN'S COLLEGE, MADURAI -14****(An Autonomous Institution - Affiliated to Madurai Kamaraj University)****(Re-Accredited with (3<sup>rd</sup> cycle) A<sup>+</sup> & CGPA 3.51 Grade by NAAC)****CBCS****DEPARTMENT OF CHEMISTRY-UG****(w.e.f. 2021 – 2022 onwards)****Skill Based Elective Paper-I****Title of the paper: Laboratory Techniques****Semester : I****Contact hours: 2****Sub code : 21SEK11****Credits : 2****Objectives:**

1. To acquire basic knowledge in the field of laboratory hygiene and safety.
2. To understand principles and techniques of semi-micro methods, volumetric methods of analysis, gravimetric methods of analysis and general purification techniques.

**Unit: I LABORATORY HYGIENE AND SAFETY:** Storage and handling of chemicals – carcinogenic chemicals – Toxic and poisonous chemicals – Waste disposal – Fume disposal – General precautions for avoiding accidents – First aid techniques – Hazards in laboratory - poisoning – methods to avoid poisoning – Treatment for specific poison – laboratory safety measures.

**Unit: II PRINCIPLES AND TECHNIQUES OF SEMI-MICRO METHODS:** Aims of semi micro qualitative analysis – theory behind inorganic qualitative analysis – Dry reactions – precipitation reactions – Applications of solubility product principle in qualitative analysis – Complexation reaction – Oxidation and reduction reactions – Spot tests – preparation of solution for cation testing on semi micro scale – Removal of interfering ions in the analysis of cations – oxalate, borate, fluoride, chromate, phosphate and arsenite.

**Unit: III VOLUMETRIC METHODS OF ANALYSIS:** General principle- Requirements for volumetric analysis-Concentration systems: Molarity, molality, normality, formality, weight percentage composition and ppm -problems. Primary and

secondary standards- criteria for primary standards, preparation of standard solutions, standardization of solutions. Limitation of volumetric analysis, endpoint and equivalence point.

**Unit: IV GRAVIMETRIC METHODS OF ANALYSIS:** Introduction- contamination of precipitates-Co-precipitation-types, post precipitation- differences between Co precipitation and post precipitation-precipitation from homogeneous solution-theory of precipitation-properties of a precipitate-general rules of precipitation-specific and selective precipitants-choice of precipitants.

**Unit: V GENERAL PURIFICATION TECHNIQUES:** Purification of solid organic compounds- recrystallisation, use of miscible solvents, use of drying agents and their properties, sublimation. Purification of liquids. Experimental techniques of distillation, fractional distillation, distillation under reduced pressure.

**Text Books:**

1. Gopalan R., Subramanian. P.S., & Rengarajan. K., “*Elements of Analytical Chemistry*”, S. Chand & Sons New Delhi, 2005.
2. Skoog D.A., West D.M. & Holler F.J, “*Analytical Chemistry*” 5<sup>th</sup> edition Saunders College Publishing, Philadelphia, 1990.
3. Mendham, J. “*Vogel’s Quantitative Chemical Analysis*”, Pearson, 2009.

**Reference Books:**

1. Dash U.N. “*Analytical Chemistry: Theory and Practice*”, Sultan Chand and sons Educational Publishers, New Delhi, 1995
2. Svehla, G. “*Vogel’s Qualitative Inorganic Analysis*”, Pearson Education, 2012.

**E.M.G.YADAVA WOMEN'S COLLEGE, MADURAI -14****(An Autonomous Institution - Affiliated to Madurai Kamaraj University)****(Re-Accredited with (3<sup>rd</sup> cycle) A<sup>+</sup> & CGPA 3.51 Grade by NAAC)****CBCS****DEPARTMENT OF CHEMISTRY-UG****(w.e.f. 2021 – 2022 onwards)****Skill Based Elective Paper-II****Title of the paper: Industrial Chemistry****Semester : I****Contact hours: 2****Sub code : 21SEK12****Credits : 2****Objective:**

1. To gain knowledge about the chemistry of important manufacturing process.

**Unit: I MATCH INDUSTRY AND EXPLOSIVES:** Match industry: Introduction - composition-types of matches-raw materials need for safety matches- manufacturing process. Pyrotechnic: Introduction-composition of fireworks- colored smokes. Explosives: Introduction- classification- characteristics of explosives- preparation and uses of TNT, picric acid, cordite and RDX.

**Unit: II SILICATE INDUSTRY:** Cement: Introduction-composition of cement-raw materials need for manufacturing of Portland cement-manufacture of Portland cement by wet process and dry process-role of gypsum in the setting of cement. Glass: Introduction-characteristics of glass- physical and chemical properties- manufacture of glass (tank furnace method)-annealing- characteristics of Borosilicate glass, optical glass, colored glass, safety glass, fibre glass, flint glass and Bottle glass.

**Unit: III AGRICULTURAL CHEMISTRY:** Fertilizer: Introduction-classification-role of various elements in plant growth-requirements of a good fertilizer-Manufacturing methods and applications of following fertilizers: ammonium sulphate, ammonium chloride, urea, super phosphate of lime, calcium cyanamide, calcium ammonium nitrate and NPK fertilizer.

**Unit: IV POLYMER CHEMISTRY:** Rubber: Introduction-composition of natural rubber-occurrence and isolation of natural rubber - draw backs of raw rubber-vulcanization-properties of vulcanized rubber- synthetic rubber- preparation and applications of SBR rubber, neoprene rubber, butyl rubber and Thiokol-Distinction between natural rubber and synthetic rubber.

**Unit: V PLASTICS AND PAPER INDUSTRY:** Plastics: Introduction-characteristics of plastics-classification of plastics- differences between thermo setting and thermo plastics- preparation and applications of Bakelite, Polythene, PVC, Polypropylene, Poly Styrene and Urea formaldehyde resin. Differences between plastics and resins. Paper industry: Introduction- raw materials and manufacturing process of paper- types of paper-paper industry in India.

**Text Books:**

1. Arora M.G. & Singh M., “*Industrial Chemistry*” Anmol Publications, Pvt Ltd, New Delhi, 1999.
2. Chakravarthy B.N., “*Industrial Chemistry*” Oxford & IBH Publishing & Co. Pvt Ltd., New Delhi, 1998.
3. Sharma B.K., “*Industrial Chemistry*” Tenth Edition, Krishna Prakashan Media (P) Ltd., Meerut, 1999.

**Reference Books:**

1. Jain and Monika Jain, “*Engineering Chemistry*” Fifth Edition, Dhanpat Rai & Sons, Delhi, 1990.
2. Mahapatra G., “*Elements of Industrial Chemistry*”, Kalyani Publishers, New Delhi, 2001.

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

(An Autonomous Institution - Affiliated to Madurai Kamaraj University)

(Re-Accredited with (3<sup>rd</sup> cycle) A<sup>+</sup> & CGPA 3.51 Grade by NAAC)**CBCS****DEPARTMENT OF CHEMISTRY-UG**

(w.e.f. 2021 – 2022 onwards)

**Non-Major Elective Paper-I****Title of the paper: Dairy Chemistry****Semester : I****Contact hours: 2****Sub code : 21NMK1****Credits : 2****Objectives:**

1. To understand the chemistry of milk and milk products.
2. To get appointment in dairy units of both private and Government and also enable them to start dairy units.

**Unit: I INTRODUCTION:** Composition of milk- physical properties- Chemical properties-functional properties-effect of heat on milk-check for purity of milk-detection of adulteration in milk.

**Unit: II MILK PROCESSING:** Milk processing: Introduction- different methods of processing of milk -clarification-pasteurization- UHT (Ultra High Temperature) milk- HTST (High Temperature short time) milk- homogenized milk- Whole milk. Chemical analysis: Butter fat, Protein, Lactose

**Unit: III MILK POWDER PROCESSING:** Introduction- skimmed milk powder- whole dry milk powder-manufacture of whole dry milk powder-butter milk powder.

**Unit: IV MILK PRODUCTS- I:** Butter: Introduction- preparation process-chemical nature of butter fat-detection of adulteration in butter. Cheese: Introduction- preparation-composition- un-ripened cheese- ripened cheese-processed cheese.

**Unit: V MILK PRODUCTS II:** Ghee: Introduction-manufacturing process-detection of adulteration in ghee. Ice-Cream: Composition-milk fat-milk solid- non fat- sweeteners-stabilizers- emulsifiers.

**Text Books:**

1. Bagavathi Sundari K., "*Applied Chemistry*" MJP Publishers, Chennai, 2006.
2. Gopalan R., Subramanian P.S. & Rengarajan K., "*Elements of Analytical Chemistry*", Sultan Chand & Sons, New Delhi, 2003.

**Reference Books:**

1. Lillian Hoauland Meyer, "*Food Chemistry*" CBS Publishers and Distributors, Delhi, 1987.
2. Robert Jenness and Patom Wiley, "*Principles of Dairy Chemistry*", New York, 2005
3. Wond F.P, "*Fundamentals of Dairy Chemistry*", Springer, Singapore, 2006.



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

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

**CBCS****DEPARTMENT OF CHEMISTRY-UG**

(w.e.f. 2021 – 2022 onwards)

**Title of the paper: Core- Inorganic, Organic and Physical Chemistry -II**

**Semester : II**

**Contact hours: 4**

**Sub code :21K21**

**Credits : 4**

**Objectives:**

1. To acquire the knowledge about the basic and detailed aspects of nuclear chemistry, acids and bases.
2. To understand oxidation and reduction, aliphatic and aromatic hydrocarbons
3. To gain knowledge about Solid states..

**Unit: I NUCLEAR CHEMISTRY:** Composition of the nucleus-stability of nuclei-mass defect-binding energy- nuclear fission-atom bomb- nuclear fusion- hydrogen bomb- Radioactivity- definition – nature of radiations from radioactive substances – comparison of the properties of  $\alpha$ ,  $\beta$  and  $\gamma$  radiations- detection and measurements of radioactivity – Geiger – Muller counter – radioactive decay –group displacement law – radioactive decay series – artificial radio activity –Half-life period-Average life period- applications of radioactive isotopes-problems using carbon dating.

**Unit: II ACIDS, BASES AND OXIDATION AND REDUCTION:** Modern concepts of acids and bases: Arrhenius, Lowry-Bronsted , Lux-Flood, solvent-system and Lewis concept. Relative strengths of acids and bases – amphoteric solvents- differentiating solvents-levelling effects. Hard and soft acids and bases: Pearson's concept –HSAB principle and its applications. Oxidation and reduction: Definitions- oxidation number-differences between oxidation number and valency- rules for calculating oxidation number- solved examples- oxidizing and reducing agents- redox reactions. Balancing of redox equations by oxidation number method.

**Unit: III ALIPHATIC HYDROCARBONS:** Alkanes- methods of preparation- by reduction of alkyl halides- by Wurtz reaction- by using Grignard's reagent. Reactions of Alkanes: Halogenation, nitration and aromatisation [no mechanisms]. Alkenes-methods of preparation-by dehydrohalogenation of alkyl halides - by heating quaternary ammonium hydroxide [Hofmann rule] - by electrolysis of salts of dicarboxylic acids and by pyrolysis (cracking of alkanes). Reactions of alkenes: catalytic hydrogenation [Sabatier-Sendersen's reduction], addition of halogen acids, addition to unsymmetrical alkenes [Markovnikov rule] - Anti Markovnikov addition [Kharash Peroxide Effect], ozonolysis [no mechanism]. Alkynes-methods of preparation: by dehydrohalogenation of 1, 2-dihalides- by electrolysis of salts of unsaturated dicarboxylic acid. Reactions of alkynes: Acidity of alkynes- oxidation reaction with strong alkaline  $\text{KMnO}_4$ , ozonolysis and polymerization reaction.

**Unit: IV AROMATIC HYDROCARBONS:** Nomenclature – aromaticity- Huckel's rule- method of preparation from petroleum, from toluene by hydro dealkylation and structural elucidation of benzene. Toluene: Preparation from n-heptane Reactions: - electrophilic substitution reactions [with  $\text{Cl}_2$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{HNO}_3$ ] - substitution in  $\text{CH}_3$  group (reaction with chlorine) - Styrene: Preparation from benzene Reactions: addition reaction with  $\text{Br}_2$  - oxidation with  $\text{KMnO}_4$  - Xylenes: Isolation of xylenes from naphtha, Oxidation of xylene with alkaline  $\text{KMnO}_4$  - Polynuclear fused Hydrocarbon: Naphthalene: preparation by Haworth synthesis Reactions: sulphonation- ozonolysis- Friedel-Craft's alkylation- oxidation reactions; uses of naphthalene.

**Unit: V SOLID STATE:** Forms of solids-Symmetry elements of a crystal- seven crystal systems, Space lattice and unit cells-Bravais lattice types and identification of lattice planes- Laws of Crystallography -Law of rational indices, Miller indices. X-Ray diffraction by crystals, Bragg's equation-derivation. Types of crystal-Molecular crystal( $\text{H}_2\text{O}$ )-covalent crystal (diamond)-ionic crystal- radius ratio rule and its limitations Characteristic structure of  $\text{NaCl}$ ,  $\text{CsCl}$ ,  $\text{ZnS}$ (Wurtzite)- Definition of Conductors, Insulators and Semi conductors- Defects in crystals- Schottky defect – Frenkel defect.

**Text Books:**

1. Bahl B.S & Arun Bahl, "Advanced Organic Chemistry", S. Chand & Company, New Delhi, 2008.
2. Puri, Sharma & Kalia, "*Principles of Inorganic Chemistry*", Vishal Publishing Co., Jalandhar 2017.
3. Puri B.R., Sharma L.R., & Madan S.Pathania, "*Principles of Physical Chemistry*", Vallabha Publications, Jalandhar, 2009.
4. Soni P.L., "*Text Book of Inorganic Chemistry*", Sultan Chand & Co, New Delhi, 2004.
5. Tewari K.S., Vishnoi N. K. & Mehotra S.N., "*A Text Book of Organic Chemistry*", 1st Edition, Vikas Publishing House Pvt. Ltd., New Delhi, 2001.

**Reference Books:**

1. Albert Cotton F., "Advanced Inorganic Chemistry", 6<sup>th</sup> Edition, Wiley India Pvt Ltd., New Delhi, 2012.
2. Bahl B.S. Tuli G.D. & Arun Bahl, "Essentials of Physical Chemistry," S.Chand & Company Ltd., New Delhi, 2004.
3. Lee J. D., "*Concise Inorganic Chemistry*", 5<sup>th</sup> Edition, Blackwell Science, USA-2003.
4. Madan R.D., "*Modern Inorganic Chemistry*", S.Chand & Co, New Delhi, 2004.
5. Wahid U.Malik, Tuli G.D., & Madan. R.D "*Selected topics in Inorganic Chemistry*", S.Chand & Co, New Delhi, 2002.

**E.M.G.YADAVA WOMEN'S COLLEGE, MADURAI -14****(An Autonomous Institution - Affiliated to Madurai Kamaraj University)****(Re-Accredited with (3<sup>rd</sup> cycle) A<sup>+</sup> & CGPA 3.51 Grade by NAAC)****CBCS****DEPARTMENT OF CHEMISTRY-UG****(w.e.f. 2021 – 2022 onwards)****Skill Based Elective Paper-III****Title of the paper: Medicinal Chemistry****Semester : II****Contact hours: 2****Sub-code : 21SEK21****Credits : 2****Objectives:**

1. To acquire basic knowledge in the field of Medicinal Chemistry.
2. To understand the drugs for various diseases and their mode of action.

**Unit: I TERMINOLOGY AND CLASSIFICATION OF DRUG:** Drug: Definition-requirements of drugs- history of drugs. Terminology in Drug Chemistry: Medicinal Chemistry-pharmacy -pharmacology- pharmacodynamics – pharmacophore – pharmacokinetics – antimetabolite - bacteria-virus and fungi. Classification of drugs: On the basis of their therapeutic action.

**Unit: II ANAESTHETICS, ANALGESICS AND ANTIPYRETICS:** Anaesthetics: Definition-characteristics-classification-application of nitrous oxide, chloroform and cocaine. Analgesics: Definition-mode of action-specific applications of antipyrine, aspirin, ibuprofen. Antipyretics: Definition-mode of action-medicinal uses of salol and paracetamol.

**Unit: III SULPHA DRUGS, ANTIBIOTICS AND ANTISEPTICS:** Sulpha drugs: Definition-mode of action-applications of sulphanilamide, sulphapyridine and sulphadiazine. Antibiotics: Definition- characteristics- mode of action- structure and uses of the following antibiotics- penicillins, streptomycin, chloramphenicol, erythromycin and tetracyclins. Antiseptics: Definition-types of antiseptics-difference between antiseptic and disinfectant.

**Unit: IV HYPNOTICS, SEDATIVES AND TRANQUILIZERS:** Hypnotics and Sedatives: Definition - types (alcohols-aldehydes, ketones and sulphones- urethans-amides and urea-barbiturates) - applications of chloral, paraldehyde, sulphonal and barbituric acid. Tranquilizer: Definition-characteristics-classification-applications of piperadol and hydroxyzine.

**Unit:V ANTINEOPLASTIC AND HYPOGLYCAEMIC DRUGS:** Cancer: Introduction-causes for cancer (poly-cyclic aromatics, nitroaromatics, chloroethylene and halogenated olefins)-treatment (Radiation, Chemotherapy, Surgical treatment)-cancer chemotherapy- mustards- antimetabolites- hormones AIDS and HIV: Introduction-transmission and treatment of HIV prevention of HIV.

**Text Books:**

1. Ashotosh Kaur, “*Medicinal Chemistry*”, 3<sup>rd</sup> Edition, New Age International Pvt Limited, New Delhi, 2006.
2. Bagavathi Sundari. K., “*Applied Chemistry*”, MJP Publishers, Chennai, 2006.
3. Jayshree Ghosh “*Text book of Pharmaceutical Chemistry*”, S. Chand publications, New Delhi 2010.

**Reference Books:**

1. Bhalerao Marry & Giragon, ” *Pharmaceutical Chemistry*”, Himalaya Publishing House, Ramdoot, 2001.
2. Gurdeep R. & Chatwal, “*Synthetic Organic Chemistry*”, Himalaya Publishing House, Ramdoot , 2001.
3. Kadam S., “*Principles of Medicinal Chemistry*”, Nirali Prakashan, New Delhi, 2006

**E.M.G.YADAVA WOMEN'S COLLEGE, MADURAI -14****(An Autonomous Institution - Affiliated to Madurai Kamaraj University)****(Re-Accredited with (3<sup>rd</sup> cycle) A<sup>+</sup> & CGPA 3.51 Grade by NAAC)****CBCS****DEPARTMENT OF CHEMISTRY-UG****(w.e.f. 2021 – 2022 onwards)****Skill Based Elective Paper-IV****Title of the paper: Forensic Chemistry****Semester : II****Contact hours: 2****Sub Code : 21SEK22****Credits : 2****Objectives:**

1. To acquire knowledge about the concept of Chemistry as related to forensic Science
2. To understand the use of chemicals in criminal investigation.

**Unit: I COLLECTION AND PRESERVATION OF EVIDENCES:** Introduction-historical development of forensic science; types of physical evidence- importance of physical evidence- collection and preservation of physical evidence- identification of physical evidence- Forensic characteristics of glass and soil - Forensic examination of hair, fibre and paints

**Unit: II EXAMINATION AND IDENTIFICATION OF DRUGS, ALCOHOL**

**AND POISONS:** Drug abuse- effects of marijuana and LSD- Alcohol-effect of the amount of alcohol consumed-analysis of alcohol by breathalyzer - Poisons- types and classification of poison - diagnosis of poisons in the living and the dead- clinical symptoms- identification of phenol, chloral, HCN, alkaloids and arsenic poisons.

**Unit: III FINGER PRINT AND FORENSIC SEROLOGY:** Finger prints- principles-detection and preservation of developed finger prints- Forensic Serology-blood types-characterization of blood stains- preservation of blood evidence - Analysis of seminal stains.

**Unit: IV CRIME DETECTION:** Document and voice examination-hand writing comparison- collection of hand writing exemplars- typewriting comparisons- voice examination-sound spectrograph- Human bombs- possible explosives (gelatin sticks and RDX) – metal detector devices

**Unit: V FORGERY AND COUNTERFEITING:** Detecting forgery in bank cheques/drafts and educational records like mark sheet, certificate using UV light. Alloy analysis using AAS to detect counterfeit coins - Checking silver line water mark in currency notes - Detecting of gold purity in 22 carat ornaments and detecting gold plated jewels.

**Text Book:**

1. James T.H., “*Forensic Sciences*”, Stanley Thornes Ltd, New York, 2005.

**Reference Book:**

1. Richard Saferstein, “*Criminalistics- A Introduction to Forensic Science*” 8<sup>th</sup> Edition, Prentice Hall, U.K., 2000.

**E.M.G.YADAVA WOMEN'S COLLEGE, MADURAI -14****(An Autonomous Institution - Affiliated to Madurai Kamaraj University)****(Re-Accredited with (3<sup>rd</sup> cycle) A<sup>+</sup> & CGPA 3.51 Grade by NAAC)****CBCS****DEPARTMENT OF CHEMISTRY-UG****(w.e.f. 2021 – 2022 onwards)****Non-Major Elective Paper-II****Title of the paper: Chemistry in everyday life.****Semester : II****Contact hours: 2****Sub code : 21NMK2****Credits : 2****Objectives:**

1. To understand the manufacturing technique of some of the small-scale industrial chemicals.
2. To enable them to start small scale manufacturing units.

**Unit: I DETERGENT POWDER AND WASHING POWDER:** Detergent powder:

Introduction- raw materials – manufacturing method from acid slurry-special features of detergent. Washing powder: Introduction- raw materials- method of manufacturing.

**Unit: II SOAPS AND INK:** Soaps: Introduction-raw materials-Manufacturing methods- Features in the preparation of toilet soaps-Ink: Introduction- different types of inks- methods of preparation of blue black liquid ink, fountain pen ink, red ink and rubber stamp ink- ink remover.**Unit: III CHALK AND CANDLES:** Chalk: Introduction- materials for manufacturing- manufacturing processes-Candles: Introduction- raw materials- manufacturing method of candles- manufacturing of fragrant candles and candles that can destroy mosquitoes- method of manufacture of superior candles.**Unit: IV PHENOILS, INCENSE STICK, SAMBIRANI AND NAPHTHALENE****BALLS:** Phenoils: Introduction- raw materials - methods of preparation and uses. Incense stick: Introduction- raw materials- method of manufacturing and uses Sambrani: Introduction- raw materials- methods of manufacturing and uses-Naphthalene Balls: Introduction- raw materials- methods of manufacturing and uses



**Unit: V PLASTER OF PARIS, GUM AND SHOE POLISH:** Plaster of Paris: Introduction- Method of manufacturing and uses- Gum: Introduction- Method of manufacturing and uses- Shoe polish: Introduction- raw materials-Method of manufacturing and uses.

**Note:** 1. Practical training for the preparation of the above said products will be provided in the Chemistry Laboratory.

**Text Books:**

1. Gobala Rao S., “*Outlines of chemical technology*”, Affiliated East West press, 1998.
2. Kafaro, “*Wasteless chemical processing*”, Mir publishers, 1995.
3. Sawyer W., “*Experimental cosmetics*”, Dover publishers, New york, 2000.

**Reference Books:**

1. Kumarappa J.C., “*Preparative materials*”, Institute of Rural Technology and Development, T. Kallupatti.
2. Mohan, “*Latest Cottage Industries*”, Malhotra et al., 20<sup>th</sup> Edition, 1980.
3. Sharma B.K., “*Industrial Chemistry*” Goel Publishing House, Meerut, 2000.

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

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

**CBCS****DEPARTMENT OF CHEMISTRY-UG**

(w.e.f. 2021 – 2022 onwards)

**Major practical-I**

**Title of the paper: Semi-micro Inorganic Qualitative analysis**

**Semester : II Contact hours: 2**

**Sub code : 21K2P Credits : 2**

(At the end of the **FIRST YEAR**)

**Internal-40 marks**

**External-60marks**

**Note:** 1. Practical Record - 10 Marks

2. Experiment and Results - 50 Marks

Analysis of a mixture containing two cations and two anions of which one is an interfering ions by semi- micro method.

**Cations:** Lead, bismuth, copper, cadmium, iron (II &III), aluminum, zinc, manganese, cobalt, nickel, barium, strontium, calcium, magnesium and ammonium

**Anions:** Carbonate, sulphate, nitrate, chloride, bromide, fluoride, oxalate, borate and phosphate.

**Mark distribution:**

Acid radicals - 20 marks

Basic radicals -20 marks

Viva-10 marks