VIVEKANANDHA COLLEGE OF
ARTS AND SCIENCES FOR WOMEN
[Autonomous]
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An ISO 9001 : 2008 Certified Institution
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Elayampalayam – 637 205. Tiruchengode, Namakkal Dt., Tamil Nadu

VIVEKANANDHA
EDUCATIONAL INSTITUTIONS

1.1 Curriculum Design and Development

1.1.2
Syllabus Revision

B.SC CHEMISTRY

(2018-19)

PG AND RESEARCH DEPARTMENT OF CHEMISTRY

Curriculum (2018-19)

Subjects	Inst. Hour/Week	Credit	Exam Hours	Internal	External	Total Marks	Subjects	Inst. Hour/Week	Credit	Exam Hours	Internal	External	Total Marks
YEAR I													
Semester I							**Semester II**						
Language I & 18U1LT01	4	3	3	25	75	100	Language II & 18U2LT02	4	3	3	25	75	100
English I & 18U1LE01B	4	3	3	25	75	100	English II & 18U2LE02B	4	3	3	25	75	100
Core I & 18U1CHC01	5	5	3	25	75	100	Core II & 18U2CHC02	4	5	3	25	75	100
Core I Practical & 18U2CHCP01	4	0	3	40	60	100	Core I Practical & 18U2CHCP01	4	4	3	40	60	100
Allied I & 18U1PHA01	5	5	3	25	75	100	Allied II & 18U2PHA02	4	5	3	25	75	100
Allied I Practical & 18U2PHAP01	4	0	3	40	60	100	Allied I Practical & 18U2PHAP01	4	4	3	40	60	100
Valued added course & 18U1VE01	2	2	3	25	75	100	Valued added course &18U2ES01	4	4	3	25	75	100
Library	1	0	0	0	0	0	Library	1	0	0	0	0	0
Sports	1	0	0	0	0	0	Sports	1	0	0	0	0	0
Total	**30**	**18**	**21**	**205**	**495**	**700**	**Total**	**30**	**28**	**21**	**205**	**495**	**700**
I YEAR TOTAL									**46**	**42**	**410**	**990**	**1400**
YEAR II													
Semester III							**Semester IV**						
Language III & 18U3LT03	4	3	3	25	75	100	Language IV & 18U4LT04	4	3	3	25	75	100
English III & 18U3LE03B	4	3	3	25	75	100	English IV & 18U4LE04B	4	3	3	25	75	100
Core III & 18U3CHC03	5	5	3	25	75	100	Core IV & 18U4CHC04	5	5	3	25	75	100
Core II Practical & 18U4CHCP02	4	0	3	40	60	100	Core II Practical & 18U4CHCP02	4	4	3	40	60	100
Allied III & 18U3MAA01	5	5	3	25	75	100	Allied IV & 18U4MAA02	5	5	3	25	75	100
Allied II Practical & 18U4MAAP01	4	0	3	40	60	100	Allied II Practical & 18U4MAAP01	4	4	3	40	60	100
NMEC I & 18U3PHN01	2	2	3	25	75	100	NMEC II & 18U4PHN02	2	2	3	25	75	100
Library	1	0	0	0	0	0	Library	1	0	0	0	0	0
Sports	1	0	0	0	0	0	Sports	1	0	0	0	0	0
Total	**30**	**18**	**21**	**205**	**495**	**700**	**Total**	**30**	**26**	**21**	**205**	**495**	**700**
II YEAR TOTAL									**90**	**84**	**820**	**1980**	**2800**
YEAR III													

Semester V							**Semester VI**						
Core V & 18U5CHC05	5	5	3	25	75	100	Core VIII & 18U6CHC08	5	5	3	25	75	100
Core VI & 18U5CHC06	5	5	3	25	75	100	Core IX & 18U6CHC09	5	5	3	25	75	100
Core III Practical & 18U6CHCP03	3	0	3	40	60	100	Core III Practical & 18U6CHCP03	3	4	3	40	60	100
Core IV Practical & 18U6CHCP04	5	0	3	40	60	100	Core IV Practical & 18U6CHCP04	4	5	3	40	60	100
Core VII & 18U5CHC07	5	5	3	25	75	100	Core X & 18U6CHC10	5	5	3	25	75	100
EC I & 18U5CHE01	3	3	3	25	75	100	Elective II & 18U6CHE02	4	3	3	25	75	100
SBEC I & 18U5CHS01	3	2	3	25	75	100	SBEC II & 18U6CHS02	3	2	3	25	75	100
Library/Sports	1	0	0	0	0	0	Library/Sports	1	0	0	0	0	0
							Extension work	0	1	0	0	0	100
Total	**30**	**20**	**29**	**245**	**555**	**800**	**Total**	**30**	**30**	**23**	**21**	**205**	**495**
TOTAL CREDIT FOR THE COURSE									**140**	**126**	**1230**	**2970**	**4200**

NO ADDITION

GENERAL CHEMISTRY-II

SUBJECT CODE: 17U2CHC02		
SEMESTER – II	**CREDIT : 5**	**HOURS : 60**

OBJECTIVES

1. To gain knowledge about shapes of inorganic molecules and metallurgy.
2. Acquire the knowledge about hydrocarbons.

Learning Outcome

Students will learn the basic concepts of ionic and covalent bond.

Students will know about the different metallurgical processes and purification techniques.

Students will gain knowledge regarding preparation and properties of alkanes, cycloalkanes, alkenes and alkynes.

Students will enhance their knowledge towards various properties of liquids.

UNIT–I Chemical bonding (12 Hours)

Ionic bond- factors influencing the formation of ionic bond- characteristics of ionic compounds- lattice energy and its determination using Born-Haber Cycle. Covalent bond- factors influencing the formation of bond- partial ionic character in covalent compounds- polarization of ions- VSEPR theory- explanation of shapes of simple covalent molecules such as NH_3, H_2O, CH_4. Molecular orbital theory- molecular orbital configuration of homo nuclear diatomic molecules- H_2, He_2, F_2, O_2 and hetero nuclear molecular orbital - CO and NO.

UNIT II Metallurgy (10 Hours)

Occurrence of metals - various steps involved in the metallurgical processes. Concentration of ore by froth floatation-gravity separation-magnetic separation processes. Calcination- Roasting - smelting- Alumino thermic process. Purification of metals by electrolysis - zone refining. Extraction of Al, Cu, Fe and U.

UNIT – III Alkanes and Alkenes (13 Hours)

Petroleum source of alkanes – Methods of preparing alkanes – Chemical properties. Mechanism of free radical substitution in alkanes by halogenation - Uses – Conformational study of ethane and n-butane. Cycloalkanes – nomenclature – methods of formation – chemical reactions, Baeyer's strain theory and its limitations. Markovnikoff's rule, peroxide effect, hydroboration, ozonolysis and allylic substitution by NBS. Diels-alder reaction. Elimination reactions-mechanisms of E1 and E2 reactions-Hofmann and saytzeff rule.

UNIT–IV Alkadiene and Alkynes (12 Hours)

Dienes- classification of dienes- isolated, conjugated, cumulated dienes, structure of allene and butadiene, 1, 2 and 1,4 addition. Orbital model of triple bond- Alkynes chemical reactions- acidity of alkynes- formation of acetylides- mechanism - hydrogenation, halogenation, hydrohalogenation, hydration, hydroboration - oxidation, Oxymercuration – Demercuration, metal ammonia reduction, oxidation and polymerization.

UNIT–V Liquid State (13 Hours)

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-Some effects of surface tension-Viscosity-Effect of temperature on viscosity (Experimental determination of surface tension and viscosity not necessary). Liquid crystals (The mesomorphic state) - classification of liquid crystal smectic-nematic and cholestric liquid crystals.

CONTENT BEYOND THE SYLLABUS

1. Apply VSEPR theory to SO_4^{2-}, XeF_4, ICl and other compounds too.
2. Find out the methods for the concentration of the ores of Cr, Zr and U.
3. Apply Anti-Markovnikov's rule for the addition of HBr to 2-Butene .
4. Compare the orbital model of allene and alkynes.
5. List out the experimental methods for the determination of surface tension and viscosity.

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).

REFERENCE BOOKS

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).

ONLINE SOURCES

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/

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DEPARTMENT OF CHEMISTRY,
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ELAYAMPALAYAM. TIRUCHENGODE.

ADDITION 19%

Programme code	B.Sc.,	**Programme Title**		Bachelor of Science (CHEMISTRY)
Course Code	18U2CHC02	**Title**	**Batch**	2018-2021
		Part III Group-A. Core II – General Chemistry - II	**Semester**	II
Hrs/Week	6		**Credits**	05

Course Objective

1. To gain knowledge about shapes of inorganic molecules and metallurgy.
2. Acquire the knowledge about hydrocarbons.
3. To study about liquids and liquid crystals.

Course Outcomes (CO)

K1	CO1	Students evaluate the shapes of simple covalent molecules.
K2	CO2	Students design the methods of extraction, separation and purification of metals from its corresponding ore.
K3	CO3	Students identify the methods of preparation and properties of alkanes and alkenes.
K4	CO4	Students assess the classification and reaction of dienes and alkynes.
K5	CO5	Students identify the various properties of liquids and liquid crystals.

UNIT–I Chemical bonding **(15 Hours)** 5%

Ionic bond- factors influencing the formation of ionic bond- characteristics of ionic compounds- lattice energy and its determination using Born-Haber Cycle. Covalent bond- factors influencing the formation of bond- characteristics of covalent compounds -partial ionic character in covalent compounds- polarization of ions- Fajan's rule and its applications. VSEPR theory- explanation of shapes of simple covalent molecules such as NH_3, H_2O, CH_4. Molecular orbital theory- molecular orbital configuration of homo nuclear diatomic molecules- H_2, He_2, F_2, O_2 and hetero nuclear molecular orbital - CO and NO.

SELF-STUDY: Study geometry of molecules which is deviated from regular geometry.

PRACTICAL WORK: How to find out bond order, para- and dia-magnetic molecules.

UNIT II Metallurgy **(15 Hours)**

Occurrence of metals - various steps involved in the metallurgical processes. Concentration of ore by froth floatation-gravity separation-magnetic separation processes. Calcination- Roasting - smelting- Alumino thermic process. Purification of metals by electrolysis - zone refining. Extraction of Al, Cu, Fe and U.

SELF-STUDY: Terms of metallurgy like ore ,minerals ,Slag,matte etc..

PRACTICAL WORK: To study the chemical properties of Al, Cu and Fe.

UNIT – III Alkanes and Alkenes **(15 Hours)** 5%

Petroleum source of alkanes – Methods of preparing alkanes – Chemical properties. Mechanism of free radical substitution in alkanes by halogenation - Uses – Conformational study of ethane and n-butane. Cycloalkanes – nomenclature – methods of formation – chemical reactions, Baeyer's strain theory and its limitations. 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 E1 and E2 reactions-Hofmann and saytzeff rule.

SELF-STUDY: Draw and practice conformational isomers of substituted alkanes.

PRACTICAL WORK: Write markovnikoff's addition product of hydroboration

UNIT–IV Alkadiene and Alkynes **(15 Hours)** 6%

Dienes- classification of dienes- isolated, conjugated, cumulated dienes, structure of allene and butadiene, 1, 2 and 1,4 addition. Orbital model of triple bond- chemical reactions of alkynes- acidity of alkynes- formation of acetylides- mechanism of Electrophilic and nucleophilic addition reactions of alkynes - hydrogenation, halogenation, hydrohalogenation, hydration, hydroboration - oxidation, Oxymercuration – Demercuration, metal ammonia reduction, oxidation and polymerization.

SELF-STUDY: Discuss the reaction of aliphatic diene and aromatic diene

PRACTICAL WORK:Alkynes are show acid nature-Why?

UNIT–V Liquid State **(15 Hours)** 3%

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-Some effects of surface tension-Viscosity-Effect of temperature on viscosity (Experimental determination of surface tension and viscosity not necessary). Refractive index - Specific refraction - Molar refraction - Optical activity. Liquid crystals (The mesomorphic state) - classification of liquid crystal smectic-nematic and cholestric liquid crystals.

SELF-STUDY: Basics of boilling point,freezing point and melting point.

PRACTICAL WORK: To know Effect of temperature on vapour pressure and Surface tension of different liquids.

TOTAL: **75 Hrs.**

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).

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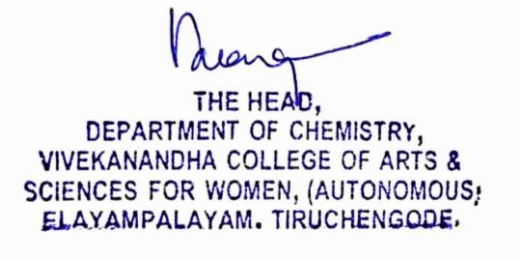
2. Madan. R. D., Inorganic Chemistry (3rd edition), New Delhi, S. Chand and Co., (2012).
3. Mukherji. S. M, Singh. S. P, Kapoor. R.P, Organic Chemistry volume – I (4th edition) New age International (p) limited (1998).

WEB SOURCES:

4. https://www.khanacademy.org/science/biology/chemistry--of-life/chemical-bonds-and-reactions/v/ionic-covalent-and-metallic-bonds
5. https://www.cliffsnotes.com/study-guides/chemistry/organic-chemistry-i/structure-and-properties-of-alkanes/alkanes-physical-properties
6. https://chem.libretexts.org/

7. http://www.chem.tamu.edu/class/fyp/mcquest/mcquest.html
8. http://nptel.ac.in/courses/104103069/15



ALLIED CHEMISTRY-I

NO ADDITION

SUBJECT CODE: 17U3CHA03		
SEMESTER – III	**CREDIT : 5**	**HOURS : 60**

OBJECTIVES

To enable the students to learn about the fundamentals of chemistry and principles of various topics.

Learning Outcome

Students will be known molecular orbital theory and types of interhalogens.

Students can understand organic reactions and types of hybridisation

Students will be enhanced their knowledge towards electrolysis, conductance and buffer solutions.

Students will learn the basics of pharmaceutical chemistry.

Students will gain knowledge about corrosion and its preventive methods.

UNIT-I: Covalent bonding (12 HOURS)

1.1 Covalent bond – Hybridization – Definition - Salient features – VSEPR theory – Shapes of inorganic molecules such as BF_3, H_2O and XeF_2.

1.2 Molecular orbital theory – postulates - bonding, anti bonding and non-bonding molecular orbital - Bond order - MO diagram for H_2, He_2, N_2, and CO.

UNIT-II: Organic Reactions (12 HOURS)

2.1 Classification of reactions - substitution, addition, elimination reactions – explanation. Isomerization.

2.2 Hybridization in methane, ethylene, acetylene.

2.3 Aromaticity - Huckel's rule. Electrophilic substitution reactions in benzene - Mechanism of nitration, sulphonation, halogenation and alkylation.

UNIT-III: Electrochemistry-I (12HOURS)

Electrolytic conduction - Faraday's law of electrolysis - Conductance of electrolytes - Specific conductance, equivalent conductance, molar conductance - variation of molar conductance with dilution - Conductometric titrations – Ostwald dilution law - pH definition - Common ion Effect - Buffer solutions – Definition - Henderson equation – Derivation – Indicators - Acid-base indicators.

UNIT-IV: Pharmaceutical Chemistry-I (12 HOURS)

Antibiotics - Definition, classification – broad and narrow spectrum antibiotics. penicillin, chloramphenical and erythromycin - structure and mode of action (structure elucidation not needed). Sulpha drugs - preparation of sulphaguanidine and sulphapyridine. Mechanism and mode of action of sulpha drugs.

UNIT-V: Applied Chemistry-I (12 HOURS)

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.

CONTENT BEYOND THE SYLLABUS

1. Apply MO theory to HF molecule.
2. Hybridization and geometry of benzene and ethane.
3. Study the preparative methods of various types of buffers.
4. Gram negative and gram positive bacteria.
5. Types of enamels and lacquers.

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).
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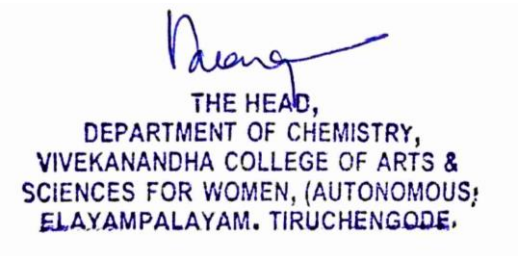
2. Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry (23rd edition), New Delhi, S. Chand &Co., (2004).
3. Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (19th edition), New Delhi, S. Chand & Co., (2010).
4. Jayashree Ghosh .S, Fundamental concepts of Applied Chemistry, New Delhi, S. Chand & Co., (2008)
5. Sharma.B.K., Industrial chemistry including chemical engineering (16th) Meerut, Krishnaprakasam media. (2011).

ONLINE SOURCES

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.
3. https://www.askiitians.com/iit-jee-chemistry/physical-chemistry/electrolytic-conductance-molar-conductance-and-specific-conductance.aspx



ADDITION 18%

Programme code	B.Sc.,	**Programme Title**	Bachelor of Science (Physics)	
Course Code	**18U3CHA03**	**Title**	**Batch**	2018-2021
		Part III	**Semester**	III
Hrs/Week	5	Allied Chemistry – I	**Credits**	05

OBJECTIVES

1. To provide a broad foundation in chemistry that stresses scientific reasoning and analytical problem solving with a molecular perspective.

2. To expose the students to a breadth of experimental techniques using instrumentation.

3. To provide students with the skills required to succeed in graduate, the chemical industry or professional.

K1	CO1	Students will be known molecular orbital theory and types of interhalogens.
K2	CO2	Students can understand organic reactions and types of hybridisation
K3	CO3	Students will be enhanced their knowledge towards electrolysis, conductance and buffer solutions.
K4	CO4	Students will learn the basics of pharmaceutical chemistry.
K5	CO5	Students will gain knowledge about corrosion and its preventive methods.

UNIT-I: Covalent bonding **(12 HOURS)** 4%

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 and non-bonding molecular orbital - Bond order - MO diagram for H_2, He_2, N_2, O_2, F_2, NO and CO.

SELF-STUDY: discuss chemical bonding types and aromatic characters

PRACTICAL WORK: bond order changes – why

UNIT-II: Organic Reactions **(12 HOURS)** 4%

Classification of reactions - substitution, addition, elimination reactions – explanation. Isomerization, polymerization and condensation (definition with examples). Hybridization in methane, ethylene, acetylene. Aromaticity - Huckel's rule. Electrophilic substitution reactions in benzene - Mechanism of nitration, sulphonation, halogenation and alkylation.

SELF-STUDY: Inductive effect, Mesomeric effect, Resonance

PRACTICAL WORK: Bromination, nitration of aromatic compounds

UNIT-III: Electrochemistry-I **(12HOURS)** 3%

Electrolytic conduction - Faraday's 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 Effect - Buffer solutions – Definition - Henderson equation – Derivation – Indicators - Acid-base indicators.

SELF-STUDY: Basic of electrochemistry, ions, electricity, conductance

PRACTICAL WORK: Preparation of buffer solution of suitable pH.

UNIT-IV: Pharmaceutical Chemistry-I **(12 HOURS)** 2%

Antibiotics - Definition, classification – broad and narrow spectrum antibiotics. penicillin, chloramphenical and erythromycin - structure and mode of action (structure elucidation not needed). Sulpha drugs - preparation of sulphaguanidine, sulphapyridine and sulphathiazole. Mechanism and mode of action of sulpha drugs.

SELF-STUDY: Drugs, classification and its effects. *PRACTICAL WORK*: Preparation of chart containing different types of drugs and its effects.

UNIT-V: Applied Chemistry-I **(12 HOURS)** 5%

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.

SELF-STUDY: Nature of metals and reason for corrosion

PRACTICAL WORK: Preparation of chart containing different types of special paint and its ingredients.

CONTENT BEYOND THE SYLLABUS

6. Apply MO theory to HF molecule.
7. Hybridization and geometry of benzene and ethane.
8. Study the preparative methods of various types of buffers.
9. Gram negative and gram positive bacteria.
10. Types of enamels and lacquers.

TEXT BOOKS

1. Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry (33rd edition), Vishal publishing co., (2017).
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REFERENCES

6. Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry (50th edition), New Delhi, S. Chand &Co., (2011).
7. Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry (23rd edition), New Delhi, S. Chand &Co., (2004).

8. Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (19th edition), New Delhi, S. Chand & Co., (2010).
9. Jayashree Ghosh .S, Fundamental concepts of Applied Chemistry, New Delhi, S. Chand & Co., (2008)
10. Sharma.B.K., Industrial chemistry including chemical engineering (16th) Meerut, Krishnaprakasam media. (2011).

ONLINE SOURCES

4. https://chem.libretexts.org/Core/Physical_and_Theoretical_Chemistry/Chemical_Bonding/Molecular_Orbital_Theory/MO_bonding_in_F2_and_O2.
5. https://www.cliffsnotes.com/study-guides/chemistry/organic-chemistry-ii/reactions-of-aromatic-compounds/electrophilic-aromatic-substitution-reactions.
6. https://www.askiitians.com/iit-jee-chemistry/physical-chemistry/electrolytic-conductance-molar-conductance-and-specific-conductance.aspx

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NO ADDITION

ALLIED CHEMISTRY-II

SUBJECT CODE: 17U4CHA04		
SEMESTER – IV	**CREDIT : 5**	**HOURS : 60**

OBJECTIVES

3. To gain knowledge about coordination compounds and natural products such as amino acids and carbohydrates.
4. Acquire the knowledge about medicinal drugs and dyes.

Learning Outcome

Students will learn the basic concepts of coordination compounds and its applications.

Students will know about the aminoacids, proteins and carbohydrates.

Students will gain knowledge regarding electrode potential and batteries.

Students will enhance their knowledge towards pharamaceutical and industrial chemistry.

UNIT-I: Coordination compounds (12 HOURS)

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- Werner's theory, VBT - its applications to $[Cu(NH_3)_4]^{2+}$, $[Ni(CO)_4]$, $[Co(NH_3)_6]^{3+}$ and $[CoCl_6]^{3-}$

UNIT-II: Amino acids and Carbohydrates (12 HOURS)

2.1 Aminoacids – Preparation - Gabriel method, Strecker synthesis - Isoelectric point, Reactions of glycine.

2.2 Carbohydrates - definition, Classification, Preparation and Reactions of glucose and fructose - Inter conversion of glucose to fructose and vice versa - sucrose and starch (structure only)

UNIT-III: Electrochemistry-II (12 HOURS)

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.

UNIT-IV: Pharmaceutical Chemistry-II (12 HOURS)

Structure and mode of action: Analgesics and Antipyretics-salicylic acid derivatives-aspirin, p-aminophenol derivatives- - 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 (12 HOURS)

Dyes – definition - requisites of a true dye, classification of dyes - based on structure and mode of application, colours and chemical constitution - Witt's theory, Bayer theory. Dyeing forces - ionic interactions, hydrogen bonds, vander-waals interaction, covalent bonds with examples, cross dyeing - principle only. Preparation of fiber and dye bath, applications of dye and finishing.

CONTENT BEYOND THE SYLLABUS

6. Apply VB theory to predict the shapes of various complexes.
7. Structures of maltose and cellulose.
8. Types of reference electrode other than calomel and hydrogen electrode.
9. General and local anaesthetics.
10. Methods involved in treating dye effluents.

TEXT BOOKS

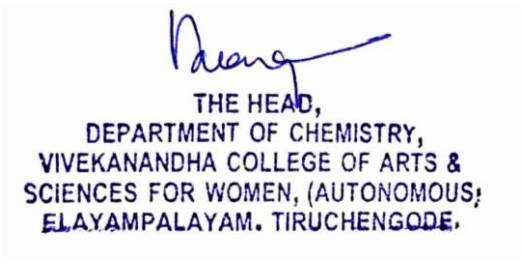
1. Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry (33rd edition), Vishal publishing co., (2017).
2. Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry , (47th edition) Vishal publishing co., (2017).
3. Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (22nd edition), New Delhi, S. Chand & Co., (2016).

REFERENCES

1. 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).
3. Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (19th edition), New Delhi, S. Chand & Co., (2010).
4. Jayashree Ghosh .S, Fundamental concepts of Applied Chemistry, New Delhi, S. Chand & Co., (2008)
5. Sharma.B.K., Industrial chemistry including chemical engineering (16th) Meerut, Krishnaprakasam media. (2011).

ONLINE SOURCES

1. https://www.scribd.com/doc/109192379/Chapter-5-Coordination-Compounds.
2. https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/carbhyd.htm.
3. http://dyes-pigments.standardcon.com/what-is-dye.html.



ADDITION

18.5%

Programme code	B.Sc.,	**Programme Title**	Bachelor of Science (Physics)	
Course Code	**18U4CHA04**	**Title**	**Batch**	2018-2021
		Part III	**Semester**	IV
Hrs/Week	5	Allied Chemistry - II	**Credits**	05

OBJECTIVES

To gain knowledge about coordination compounds and natural products such as amino acids and carbohydrates.

Acquire the knowledge about medicinal drugs and dyes.

K1	CO1	Students will learn the basic concepts of coordination compounds and its applications.
K2	CO2	Students will know about the aminoacids, proteins and carbohydrates.
K3	CO3	Students will gain knowledge regarding electrode potential and batteries.
K4	CO4	Students will enhance their knowledge towards pharamaceutical and industrial chemistry.
K5	CO5	Students will dyes and its importance.

5%

UNIT-I: Coordination compounds **(12 HOURS)**

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- Werner's 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.

SELF-STUDY: Chelate formation in biological systems.

PRACTICAL WORK: Preparation of Tetraaminecopper complexes.

4%

UNIT-II: Amino acids and Carbohydrates (12 HOURS)

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 (structure only)

SELF-STUDY: Different biomolecules and its importance

PRACTICAL WORK: Identification and determination of glucose

3%

UNIT-III: Electrochemistry-II (12 HOURS)

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 - definition – lead acid battery.

SELF-STUDY: Galvanic series and electrochemical series

PRACTICAL WORK: Construction of a cell with different electrode and measure its potential.

4%

UNIT-IV: Pharmaceutical Chemistry-II (12 HOURS)

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.

SELF-STUDY: Drugs and its importance.

PRACTICAL WORK: Construct a chart on different drugs showing its effects on humans.

UNIT-V: Applied Chemistry-II **(12 HOURS)** 2.5%

Dyes – definition - requisites of a true dye, classification of dyes - based on structure and mode of application, colours and chemical constitution - Witt's 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 and finishing.

SELF-STUDY: Classification of dyes and its uses in textiles.

PRACTICAL WORK: Prepare a chart showing the dyeing process used for different fabrics.

CONTENT BEYOND THE SYLLABUS

11. Apply VB theory to predict the shapes of various complexes.
12. Structures of maltose and cellulose.
13. Types of reference electrode other than calomel and hydrogen electrode.
14. General and local anaesthetics.
15. Methods involved in treating dye effluents.

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).

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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).
3. Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (19th edition), New Delhi, S. Chand & Co., (2010).

4. Jayashree Ghosh .S, Fundamental concepts of Applied Chemistry, New Delhi, S. Chand & Co., (2008)
5. Sharma.B.K., Industrial chemistry including chemical engineering (16th) Meerut, Krishnaprakasam media. (2011).

ONLINE SOURCES

1. https://www.scribd.com/doc/109192379/Chapter-5-Coordination-Compounds.
2. https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/carbhyd.htm.
3. http://dyes-pigments.standardcon.com/what-is-dye.html.

THE HEAD,
DEPARTMENT OF CHEMISTRY,
VIVEKANANDHA COLLEGE OF ARTS &
SCIENCES FOR WOMEN, (AUTONOMOUS)
ELAYAMPALAYAM. TIRUCHENGODE.

NO ADDITION

CORE PAPER – VI

INORGANIC CHEMISTRY-I

SUBJECT CODE: 17U5CHC06		
SEMESTER – V	**CREDIT : 5**	**HOURS : 60**

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.

Learning Outcome

Students will master the basics in inorganic chemistry of acids & bases, solvents and coordination complexes.

Students will have basic understanding on the chemistry of inorganic complexes.

Students will be able to interpret the applications of inorganic compounds in day to day life.

UNIT-I: Modern Concepts of Acids and Bases (12 HOURS)

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.

UNIT – II: Non-Aqueous Solvents (12 HOURS)

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, liq. N_2O_4, anhydrous H_2SO_4, liq.HF, and molten salts.

UNIT-III: Chemistry of f-Block Elements 12 HOURS)

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 – important compounds – preparation,

properties and uses of Uranyl nitrate, Uranium hexa fluoride, Thorium dioxide and Thorium nitrate - Comparison of Lanthanides and Actinides.

UNIT-IV: Coordination Chemistry-I (12 HOURS)

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 (12 HOURS)

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.

CONTENT BEYOND THE SYLLABUS

1. Students will be able to prepare simple coordination complexes in lab.
2. Students can analyze and check the properties of acids and bases in lab.
3. Students will be able to understand the chemistry of many coordination complexes and their use as drugs.

TEXT BOOKS

1. Puri, Sharma, Kalia, Principles of Inorganic Chemistry 32nd Edition (2014), Milestone Publishers and Distributor, New Delhi.
2. Wahid. 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 (1987), S. Chand Publishing,
   New Delhi.

REFERENCE BOOKS

1. Satya Prakash, G.D. Tuli, S.K. Basu and R.D. Madan, Advanced Inorganic Chemistry –
   Vol – I (2006), S. Chand Publishing, New Delhi.
2. Satya Prakash, G.D. Tuli, S.K. Basu and R.D. Madan, Advanced Inorganic Chemistry –
   Vol – II (2006), S. Chand Publishing, New Delhi.

ONLINE SOURCES

1. https://en.wikibooks.org/wiki/Introduction_to_Inorganic_Chemistry
2. https://en.wikipedia.org/wiki/Inorganic_chemistry
3. https://www.chemguide.co.uk/inorgmenu.html

THE HEAD,
DEPARTMENT OF CHEMISTRY,
VIVEKANANDHA COLLEGE OF ARTS &
SCIENCES FOR WOMEN, (AUTONOMOUS)
ELAYAMPALAYAM. TIRUCHENGODE.

ADDITION 16%

	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

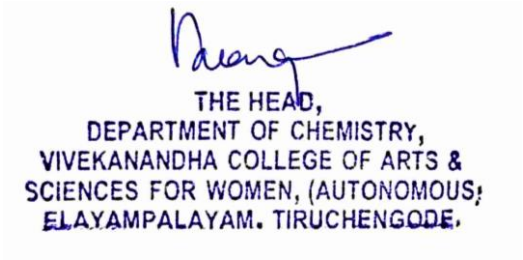
Content of the Syllabus				
Unit – I	**Modern Concepts of Acids and Bases**	Periods	12	6%
	Acids and Bases - Arrhenius concept - Bronsted - Lowry concept - Luxflood concept - Lewis concepts of acids and bases - Usanovich concept - Conjugate acid - base pairs - Relative strength of acids and bases: Hydracids & 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

10%

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



SKILL BASED ELECTIVE COURSE – I

NO ADDITION

SPECTROSCOPY

SUBJECT CODE: 17U5CHS01		
SEMESTER – V	**CREDIT : 2**	**HOURS : 60**

OBJECTIVES

Students acquire the knowledge about the fundamentals and different types of spectroscopy.

Learning Outcome

Students know principle, instrumentation and applications of Rotational spectroscopy.

Students can able to learn theory, laws, 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.

To understand the concept of NMR spectrum and its applications.

Students have an idea of different types of peak, Nitrogen rule and fragmentation of Mass spectroscopy.

UNIT – I Rotational Spectroscopy (12 HOURS)

Fundamental concepts electromagnetic spectrum – Region of spectrum, Interaction of radiation with matter. Rotational Spectroscopy - Principle-Instrumentation-Selection rules for rotational spectroscopy - Applications of rotation spectra: bond length-isotopic substitution.

UNIT – II IR & Raman Spectroscopy (12 HOURS)

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.

UNIT – III NMR spectroscopy (12HOURS)

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 .TMS & its applications, peak area and number of protons –splitting of signals-spin-spin coupling.

UNIT – IV UV-VIS spectroscopy (12 HOURS)

Theory-Instrumentation-Beer-Lamberts Law – bands in UV-VIS spectrum – possible electronic transitions – types of electronic transitions based on selection rules – characteristic absorption (λ_{max} and ε_{max}) of carbonyl , isolated double bond, conjugated double bond systems and aryl groups – Spectroscopic terms: Chromophore, Auxochrome, Bathochromic shift, Hypsochromic shift, Hypochromic shift, Hyperchromic shift..

UNIT – V Mass spectroscopy (12 HOURS)

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.

CONTENT BEYOND SYLLABUS

1. Rotational spectra of diatomic molecules – H_2, HCl.
2. Theory and instrumentation of Raman Spectroscopy.
3. Determination of structure of molecules using different spectroscopic techniques.

TEXT BOOKS

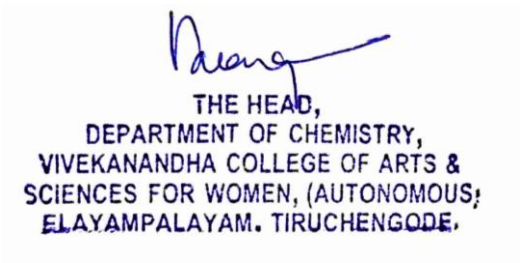
1. Chatwal Anand, Instrumental methods of chemical analysis, Himalaya Publishing, 1980.
2. Y.R.Sharma, Elementary Organic Absorption Spectroscopy – principles and chemical applications, S.Chand and Co., 2006.
3. K.V.Raman, R.Gopalan and P.S.Ragavan, Molecular spectroscopy, K.V.Raman, R.Gopalan and P.S.Ragavan Thomson Publications, 2004.

REFERENCE BOOKS

1. Collin N.Banwell, Mc Cash and M.Elaine, Fundamentals of Molecular Spectroscopy, Tata Mc.Graw Hill Publishing, New Delhi, 1994.
2. Jag Mohan, Organic Analytical Chemistry, Narosa Publishers, 2003.
3. William Kemp, Organic Spectroscopy, 3 rd Edition, Palgrave publishers, 2007.
4. Robert M. Silverstein, Francis X.Webster, David J. Kiemle, David L. Bryce, Spectrometric Identification of Organic Compounds, 8th Edition, 2015.
5. G. Aruldhas, Molecular Structure and Spectroscopy, PHI Learning Pvt. Ltd., 2004.

ONLINE SOURCES

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



ADDITION 18%

	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

5.

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	5%

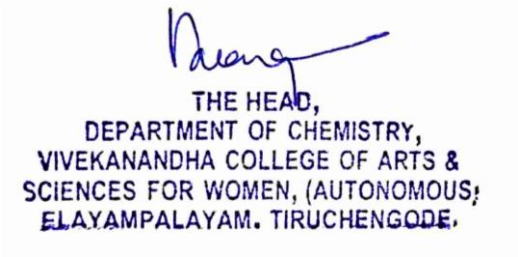
	Fundamental concepts electromagnetic spectrum - Region of spectrum, Interaction of radiation with matter. Rotational Spectroscopy - Principle-Instrumentation-Selection rules for rotational spectroscopy - Molecular rotation-diatomic molecule as rigid rotor-diatomic molecule as non-rigid rotor. Applications of rotation spectra: bond length-isotopic substitution.			
Unit - II	**UV-VIS spectroscopy**	Periods	6	2%
	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	4%
	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	2%
	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	5%
	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	

6.

7.

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



NO ADDITION

CORE PAPER - VIII

CHEMISTRY OF NATURAL PRODUCTS

OBJECTIVES

1. To gain knowledge about optical and geometrical isomerism.
2. Acquire the knowledge about heterocycles.
3. To understand the reaction mechanism and reagents in organic synthesis.

Learning Outcome

To gain an insight into basic concept of optical isomerism.

To providing theoretical understanding of heterocyclic chemistry which includes various methods of synthesis and application of those methods for the preparation of specific groups of heterocyclic systems.

To understand geometric isomerism and conformational isomerism

To acquire basic knowledge of mechanism of organic reactions.

To understand the reagents in organic synthesis

UNIT- I Fats, Oils and Wax (12 Hours)

Occurrence, properties - hydrogenation, drying of oils, hydrogenolysis, Rancidity. Analysis of oils and fats – saponification, iodine number. Synthetic detergents – classification, Occurrence of wax, difference between wax and lipids, phosphoglycerides, phosphate esters, phosphate ester acids, cell membrane.

UNIT II Alkaloids (12 Hours)

Alkaloids-classification-isolation, general methods of determination of structure of alkaloids-synthesis and structural elucidation of piperine, atropine and nicotine. Terpenes-classification, isolation, isoprene rule, synthesis and structural elucidation of citral, geraniol, alpha pinene.

UNIT III Steroids, Hormones and Vitamins (12 Hours)

Steroids – definition – Cholesterol and Ergosterol (structure only). Steroidal Harmones – Androsterones, Testrosterone, Progestrone and Oestrone (structure only). Vitamins – Introduction, Classification, occurrence and deficiency of vitamins – Structures of water and fat soluble vitamins. Synthesis of Retinol, Thiamine and Ascorbic acid.

UNIT IV Amino acids and proteins (12 Hours)

Amino acids-classification-essential and non essential amino acids-preparation of alpha amino acids-glycine, alanine and tryptophan-General properties of amino acids-Zwitter ions, isoelectric point. Peptides and proteins-synthesis of peptide- Bergmann method. Proteins-classification based on physical and chemical properties and on physiological functions-primary and secondary structure of proteins-helical and sheet structures (elementary treatment only) – Denaturation of proteins.

UNIT V Carbohydrates (12 Hours)

Classification, Reactions of Glucose and Fructose- open chain and ring structures of glucose and fructose- -mutarotation, anomers, epimers and diastereomers. Interconversion of monosaccharides- conversion of pentose to hexose and vice-versa, aldose to ketose and vice-versa. Disaccharides-structural elucidation of sucrose and maltose, Polysaccharides-structure of starch and cellulose - derivatives of cellulose.

CONTENT BEYOND THE SYLLABUS

1. Structure and of some important alkaloids, terpene such as quninine, morphine and Limonene, carvone.
2. Isomerism of amino acids, occurrence and functions in biochemistry.
3. Benefits of fats and oils, Micelle formation and their uses.
4. Carbohydrates classifications, Sources, Nutrition benefits of carbohydrates.
5. General methods of classification of steroids uses of Vitamin

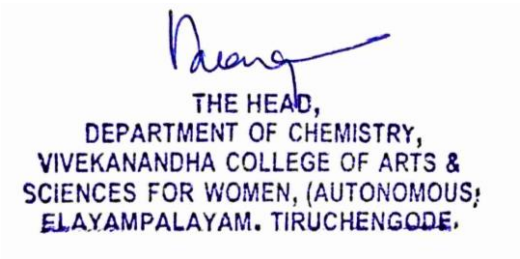
TEXT BOOKS

1. Finar I.L. Organic chemistry vol I & II- ELBS, Pearson Education Ltd., 2008.
2. O.P. Agarwal- Reactions and Reagents- Krishna prakashan media (p) Ltd., 1975
3. Bhal B.S and Arun Bhal- A text book of organic chemistry, S. Chand & company Ltd, 1948.

REFERENCES

1. Kalsi P.S Stereochemistry Conformation and Mechanism-, New Age International (p) Ltd, VIIth ,2008.

2. Nasipuri D. Stereochemistry of organic compounds , second edition,Wiley Eastern Ltd., 1994.
3. K.S. Tewari, and N.K. Vishoni, Organic Chemistry, Vikas Publishing House.
4. Soni.P.L and Chawla.H.M. Text book of organic chemistry,26th revised edition, Sultan chand and sons, 1995.
5. V.K. Ahuluwalia, Rakesh kumar, Parashar R.K, Organic reaction and mechanism,IVth edition, Narosa publishing house Pvt Ltd., 2011.
6. R.T. Morrison and Boyd, Organic Chemistry, VIth edition., PHI Learning Pvt Ltd., 2008.



ADDITION 44%

	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

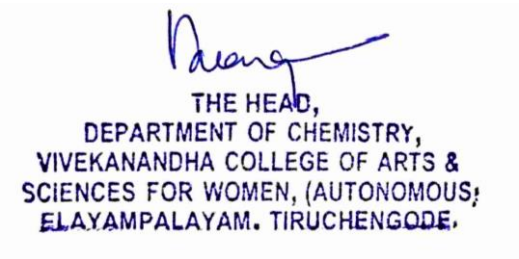
Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus				
Unit - I	**Fats, Oils and Wax**	Periods	12	10%
	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.			

	Terpenoids and Alkaloids	Periods	12	10%
	Terpenoids and alkaloids- Occurrence - Terpenes: General methods of determination of structure of Terpenoids. 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	6%
	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	6%
	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	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



CORE PAPER - IX

NO ADDITION

INORGANIC CHEMISTRY – II

SUBJECT CODE: 17U6CHC09		
SEMESTER – VI	**CREDIT : 5**	**HOURS : 60**

OBJECTIVES

1. To gain knowledge about the geometry of crystals and its significance.
2. Acquire the knowledge about the different oxidation states of halogens.

Learning Outcome

To gain an insight into characterization of inorganic compounds.

To acquire basic knowledge on electronegativity of different halogens and their resulting interhalogen compounds.

To enable the students to design and synthesis pharmaceutically valuable complexes.

UNIT – I: Solid State Chemistry (12 Hours)

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. Defects in ionic crystals: Schottky, Frenkel defects.

UNIT – II: Inter Halogens and Pseudohalogens (12 Hours)

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.

UNIT – III: Electron Deficient Compounds (12 Hours)

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 –

UNIT – IV: Coordination Chemistry – III (12 Hours)

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 .

UNIT-V: Organometallic Compounds (12 Hours)

Organometallic compounds: Definition – Classification based on nature of C-M bond: Ionic, σ bonded and non classically bonded. Organometallic compounds of Lithium and Boron - preparation, properties, structure and uses. Olefin complexes - Zeise's salt - synthesis and structure Cyclopentadienyl complexes - Ferrocene- preparation, properties, bonding and uses.

CONTENT BEYOND THE SYLLABUS

1. Significance of XRD studies.
2. Naturally occurring coordination complexes.
3. Compounds containing non-classical bonds.

TEXT BOOKS

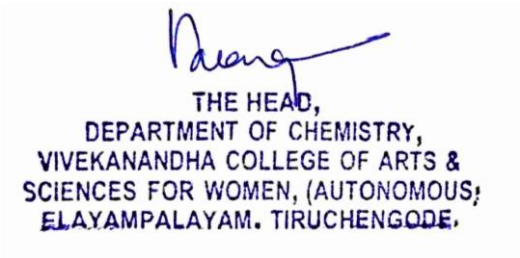
1. Puri, Sharma, Kalia, Principles of Inorganic Chemistry 32nd Edition (2014), Milestone Publishers and Dustributor, New Delhi.
2. Wahid. U. Malik, G. D. Tuli, R. D. Madan, Selected topics in Inorganic Chemistry, S.Chand & company, New Delhi.
3. R. D. Madan, Satyaprakash's Modern Inorganic Chemistry, S. Chand Publishing, New Delhi.

REFERENCE BOOKS

1. Satya Prakash, G.D. Tuli, S.K. Basu and R.D. Madan, Advanced Inorganic Chemistry –
   Vol – I (2006), S. Chand Publishing, New Delhi.
2. Satya Prakash, G.D. Tuli, S.K. Basu and R.D. Madan, Advanced Inorganic Chemistry –
   Vol – II (2006), S. Chand Publishing, New Delhi.

ONLINE SOURCES

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



ADDITION

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	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.

4.

5.

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

6.

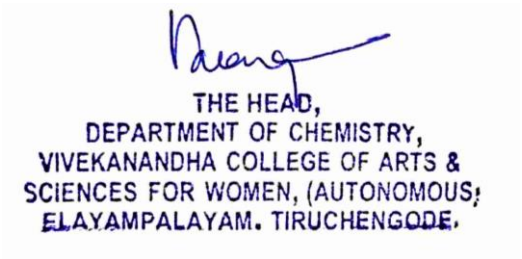
Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			4%
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



ELECTIVE COURSE – II

NO ADDITION

MEDICINAL CHEMISTRY

SUBJECT CODE: 17U6CHE02		
SEMESTER – VI	**CREDIT :3**	**HOURS : 60**

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 chemotheraphy.

Learning Outcome

Students will learn the basic principles of chemistry involved in life sciences.

Students will have basic understanding on cancer chemotherapy and haemetology.

Students will be able to incorporate the causes of various diseases and proper usage of medicines.

Students will be able to know the different types of drugs being used in drug industry.

UNIT – I Study of Drugs **(12 Hours)**

Definition of the terms – Drug, Pharmacophore, Pharmacodynamics, pharmacology, pharmacokinetics, Bacteria, Virus, Fungus, Metabolites, Metabolism of drug, Antimetabolites, L_{D50}, E_{D50} . Classification of drugs, Assay of drugs – Specific methods.

UNIT – II Antibiotics (12 Hours)

Antibiotics – definition – classification as broad and narrow spectrum antibiotics. Structure, properties, mode of action and uses of penicillin, chloramphenicol, tetracycline, puromycin .

UNIT – III Sulphonamides (12 Hours)

Sulphonamides – preparation, properties and uses of sulphanilamides – mechanism and action of sulpha drugs – preparation, properties and uses of sulphadiazine, sulphapyridine, and sulphathiazole

UNIT – IV Blood and Haematological Agents (12 Hours)

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. Blood pressure, hypertension, clotting of blood and haemotological agents.

UNIT – V Cancer Chemotherapy (12 Hours)

Types of neoplasms – sarcoma, carcinoma, carcinosarcoma, teratoma, leukemia and polycythemia. Causes of cancer – virus and chemicals. Treatment of cancer – surgery, radiation therapy and medical therapy. Cytotoxic anticancer drugs – alkylating agents – Bis-chloroethylamines, Cyclophosphamide, Alkyl Sulfonates, Nitrosoureas – Miscellaneous of alkylating agents – Mode of action of Alkylating agents.

CONTENT BEYOND THE SYLLABUS

1. Students will be able to prepare simple organic compounds in lab.
2. Students can analyze and check the properties of drugs.
3. Students will be able to understand the chemistry of many chemical compounds and their use as drugs.

TEXT BOOKS

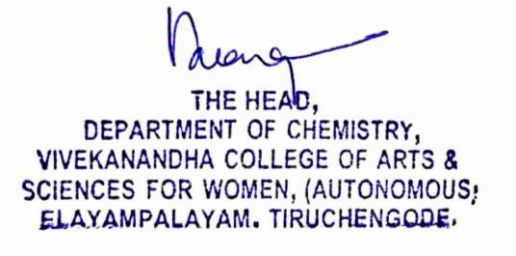
1. S.Lakshmi, Pharmaceutical Chemistry, S.Chand & Sons ,New Delhi,2004.
2. V.K.Ahluwalia and Madhu Chopra, Medicinal Chemistry ,Ane Books,New Delhi,Reprint 2009.

REFERENCE BOOKS

1. Graham Patrick, Medicinal Chemistry ,VIVA Books Private Ltd , New Delhi ,2002 .
2. Rama Rao 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.

ONLINE SOURCES

1. https://pharmafactz.com/introduction-to-medicinal-chemistry/
2. https://en.wikipedia.org/wiki/Medicinal_chemistry
3. http://library.umac.mo/ebooks/b28050332.pdf



ADDITION

14%

	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	3%
	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	4%

	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

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SKILL BASED ELECTIVE COURSE – II

NO ADDITION

POLYMER CHEMISTRY

SUBJECT CODE: 17U6CHS02		
SEMESTER – VI	**CREDIT : 2**	**HOURS : 60**

OBJECTIVES

To impart the students the knowledge of polymer materials, their formation mechanisms, properties and uses.

Learning Outcome

Students will be able to gain knowledge about the properties and classification of polymers.

Students will be able to estimate the number- and weight-average molecular masses of polymers given the degree of polymerisation and mass fraction of chains present.

Students will enhance their knowledge towards the commercially important polymers, their preparation and applications.

UNIT-I POLYMERS CLASSIFICATION AND PROPERTIES (12 Hours)

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 - Physical properties of polymers - Elasticity, Tensile strength, Glass Transition Temperature.

UNIT –II TECHNIQUES AND MECHANISM OF POLYMERIZATION (12 Hours)

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.

UNIT – III MOLECULAR WEIGHT AND ITS DETERMINATION (12 Hours)

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.

UNIT –IV POLYMER DEGRADATION AND COMPOUNDING MATERIALS OF POLYMERS (12 Hours)

Polymer degradation-Definition- Types of degradation- Thermal degradation-Mechanical degradation, Hydrolytic degradation, Photodegradation and Biodegradation. Compounding Materials of Polymers-Plastics-Colorants-Antioxidants-Stabilizers and Lubricants and Differences.

UNIT-V INDUSTRIALLY IMPORTANT POLYMERS (12 Hours)

Individual Polymers-Polyacrylates, Polystyrene, Polyethylene, Polyvinylchloride, Polyester, Polyamides- (Nylon-6, Nylon 6,6). Types of Rubber - Natural Rubber and synthetic process – Vulcanization. Fibre Reinforced Plastic (FRP) - Conducting Polymers, polymers in biological application.

CONTENT BEYOND THE SYLLABUS

1. Bullet proof plastics.
2. Preparation of Polymer nanocomposites and their applications.
3. Polymer based solar cells and its application in energy storage.

TEXT BOOKS:

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

ONLINE SOURCES

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-processe

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SCIENCES FOR WOMEN, (AUTONOMOUS)
ELAYAMPALAYAM. TIRUCHENGODE.

ADDITION 16%

	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	2%
	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	4%

	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

ADDITION 100%

Programme code	B.Sc.,	**Programme Title**	Bachelor of Arts, Bachelor of Science & Bachelor of Commerce	
Course Code	**18U3CHN01**	**Title**	**Batch**	2018-2021
		Part IV Non-Major Elective Course-I Industrial Chemistry	**Semester**	III
Hrs/Week	3		**Credits**	02

Course Objective

1. To learn the importance of water chemistry.
2. To understand the manufacturing of soaps, detergents and glass of different types.
3. To enable the students to learn about the preparation and importance of various industrial products.

Course Outcomes (CO)

K1	CO1	Students will be known the various methods involved in water quality analysis.
K2	CO2	Students can understand the manufacture of soap and detergents.
K3	CO3	Students will be enhanced their knowledge towards manufacture of glass.
K4	CO4	Students will learn the basic concepts involved in lubricants. Students will gain knowledge about petroleum products.
K5	CO5	Students will learn how to conduct a volumetric estimation process precisely.

UNIT –I: Water chemistry – I (6HOURS)

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.

SELF-STUDY: Water quality parameters.

PRACTICAL WORK: Determination of COD, pH, electrical conductivity of drinking water.

UNIT-II: Soaps and detergents (6HOURS)

Soaps: manufacture – toilet and transparent soaps - metal soaps, cleansing action of soap. Detergents: Manufacture of synthetic detergents - anionic detergents - cationic detergents and amphoteric detergents.

SELF-STUDY: Determining quality of good soap and to study the ingredient used in different soaps.

PRACTICAL WORK: Preparation of Soap using different oils.

UNIT–III: Glass industry (6HOURS)

Glass – physical and chemical properties of glass – characteristics – manufacture: formation of batch material – melting – shaping – annealing – finishing – special glass: optical, borosilicate and coloured glass.

SELF-STUDY: Application of various glasses

PRACTICAL WORK: Preparation of chart for various application of special glass.

UNIT–IV: Lubricants (6HOURS)

Definition – functions – properties – viscosity index – pour point – cloud point – classification – additives for lubricants – grease – solid lubrications – emulsions.

SELF-STUDY: Basic requirements of lubricants.

PRACTICAL WORK: Prepare a chart containing hydrocarbon composition in lubricants.

UNIT–V: Petroleum and Petrochemicals (6HOURS)

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.

SELF-STUDY: Theories of formation of petroleum.

PRACTICAL WORK: Construct a model showing complete process of various cracking techniques.

CONTENT BEYOND THE SYLLABUS

1. Analysis of toxic metals in water.
2. Superiority of detergents over soaps. Explain.
3. Special glasses.
4. Types of lubricants.
5. Cetane number.

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.

REFERENCE BOOKS

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

ONLINE SOURCES

1. https://www.scribd.com/document/274281762/Water-Technology-Ppt
2. nptel.ac.in/courses/103107082/module6/lecture5/lecture5.pd.

ADDITION

100%

Programme code	B.Sc.,	**Programme Title**	Bachelor of Arts, Bachelor of Science & Bachelor of Commerce	
Course Code	**18U3CHN02**	**Title**	**Batch**	2018-2021
		Part IV Non-Major Elective Course-II Medicinal Chemistry	**Semester**	III
Hrs/Week	3		**Credits**	02

Course Objective

1. To study the system of Indian medicines
2. To learn the importance and evaluation of drugs.
3. To prepare and analyse the drugs.

Course Outcomes (CO)

K1	CO1	Students known the systems of Indian medicines
K2	CO2	Students able to understand the drugs.
K3	CO3	Students enhanced their knowledge towards preparation of drugs.
K4	CO4	Students learn the importance of medicinal plants.
K5	CO5	Students know to analyse the drug and its quality.

UNIT - I INTRODUCTION TO PHARMACOGNOSY (6HOURS)

History, Definition and scope of pharmacognosy; Systems of Indian Medicines – Siddha, Unani, Ayurveda, Homeopathy; Terminologies.

SELF-STUDY: Plant, zoo pharmacognosy and its importance.

PRACTICAL WORK: Extraction of drug from a medicinal plants.

UNIT - II CLASSIFICATION OF DRUGS (6HOURS)

Classification of Crude drugs – Taxonomical, Morphological, Pharmacological and chemical classifications; Chemistry of drugs and its evaluation.

SELF-STUDY: Drugs and its importance.

PRACTICAL WORK: Classify the drugs known to you on different basics.

UNIT - III PREPARATION AND APPLICATION OF DRUGS (6HOURS)

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.

SELF-STUDY: Medicinally important plants and animals.

PRACTICAL WORK: Preparation of herbal syrups.

UNIT – IV PLANTS AS DRUGS (6HOURS)

Organoleptic study of the following medicinal plants: Fruit – Amla, Bulb – Garlic, Rhizome – Ginger, seed – castor, Bark – Cinchona, Leaves – Neem, Flower – Clove.

SELF-STUDY: Different chemical compound in various medicinal plants and its uses.

PRACTICAL WORK: Extraction of vitamin-C from amla.

UNIT – V ANALYTICAL STUDIES (6HOURS)

Analytical Pharmacognosy – drug adultration and detection. Biological testing of herbal drug. Phytochemical investigations with reference to secondary metabolites of locally available medicinal plants.

SELF-STUDY: Function groups present in various drugs and its quantitative estimation.

PRACTICAL WORK: Qualitative and quantitative analysis of various drugs.

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. Pharmacognosy, S.B.Gokhale, Dr.C.K. Kokate, A.P. Purohit, Publisher: Nirali Prakasham, Pune, 2002
2. Herbs that Heal, Acharya Vipul Rao – Diamond Pocket Books, New Delhi, 2005
3. Practical Pharmacognosy. Dr.C.K. Kokate et al. 2003
4. An Introduction to Medicinal Botany and Pharmacognosy – N.C. Kumar, Emkay Publications, New Delhi, 2004.

CONTENT BEYOND THE SYLLABUS

1. Different types of Indian medicine system.
2. Advantage of different medicine system.
3. Uses of different minerals in Indian medicine system.

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.

REFERENCE BOOKS

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

ONLINE SOURCES

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

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SCIENCES FOR WOMEN, (AUTONOMOUS)
ELAYAMPALAYAM. TIRUCHENGODE.

ADDITION 100%

Programme code	B.Sc.,	**Programme Title**	Bachelor of Arts, Bachelor of Science & Bachelor of Commerce	
Course Code	**18U3CHN03**	**Title**	**Batch**	2018-2021
		Part IV Non-Major Elective Course-III Water Quality Analysis	**Semester**	III
Hrs/Week	3		**Credits**	02

Course Objective

1. To study the characteristics of water
2. To learn the importance of water purification
3. To analyse the quality measurement about water

Course Outcomes (CO)

K1	CO1	Students knew the various sources of water.
K2	CO2	Students able to understand the importance of various water quality parameters.
K3	CO3	Students able to determine the hardness of water.
K4	CO4	Students knowledge on sources, analysis and control methods of industrial waste water .
K5	CO5	Students learn how to treat polluted water.

UNIT-I INTRODUCTION TO HYDROLOGY (6HOURS)

World water resource; water resources of India- Different ecosysytem of hydrology-Riverine, Estuarine and marine-Status of water quality in India.

SELF-STUDY: Domestic, industrial and agricultural importance of water.

PRACTICAL WORK: Prepare a chart with different sources of water and their water quality.

Unit-II CHARACTERISTICS OF WATER (6HOURS)

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 CO_2 – dissolved O_2 – free chlorine – chlorine demand.

SELF-STUDY: Domestic water quality standards by WHO.

PRACTICAL WORK: Determination of pH, conductivity, acidity and alkalinity of water from different sources.

Unit-III WATER TREATMENT (6HOURS)

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.

SELF-STUDY: Different minerals present in water; relation between BOD, COD and water pollution

PRACTICAL WORK: Determination of hardness of water.

UNIT-IV: INDUSTRIAL WATER POLLUTION, ITS CONTROL & ANALYSIS (6HOURS)

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.

SELF-STUDY: Case studies on water pollution.

PRACTICAL WORK: Quantitative analysis of Cd, Cr, Cu etc., in polluted water.

UNIT-V: INDUSTRIAL WASTE WATER TREATMENT (6HOURS)

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.

SELF-STUDY: Basics of aerobic and anaerobic process.

PRACTICAL WORK: Biopurification of water.

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

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)

CONTENT BEYOND THE SYLLABUS

1. Analysis of toxic metals in water.
2. Different techniques used in hardness estimation.
3. Advantages and disadvantages of different water treatment processes.

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.

REFERENCE BOOKS

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

ONLINE SOURCES

1. https://www.cdc.gov/healthywater/drinking/public/water_treatment.html
2. https://www.hunterwater.com.au

THE HEAD,
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ADDITION 100%

Programme code	B.Sc.,/B.A.,	**Programme Title**	Bachelor of Arts, Bachelor of Science & Bachelor of Commerce	
Course Code	**18U4CHN04**	**Title**	**Batch**	2018-2021
		Part IV	**Semester**	IV
Hrs/Week	3	**Non Major Elective Course** **FOOD AND NUTRITION**	**Credits**	02

Course Objective

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.

Course Outcomes (CO)

K1	CO1	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.
K2	CO2	Students will evaluate others aspects of food quality.
K3	CO3	Students can impact of food preservation, processing, packaging and distribution on food quality.
K4	CO4	Students produce a variety of food products applying principles of food handling and preparation
K5	CO5	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

Unit-I: FOOD SOURCES (6HOURS)

Introduction-types-sources-nutrients of foods: carbohydrate, protein, fats, oils – functions of food.

SELF-STUDY: Food classification based on nutrients

PRACTICAL WORK: Find the percentage of edible portion of foods

Unit-II: FOOD POISONING AND ADULTERATION (6HOURS)

Food poisoning: Sources, causes and remedy- Food adulteration: Types, common adulteration in food.

SELF-STUDY: Advanced analysis methods for food hazards, adulteration and traceability

PRACTICAL WORK: Execute a sampling plan to monitor chemical and microbiological hazards in food

Unit-III: FOOD PRESERVATION AND PROCESSING (6HOURS)

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.

SELF-STUDY: Different methods of food preservation and processing

PRACTICAL WORK: List out the role of chemicals in food preservation.

Unit –IV: VITAMINS (6HOURS)

Definition-types-functions, Sources, deficiency diseases of A, C, K, E and B1,B12,B6.

SELF-STUDY: Fat soluble and water soluble vitamins

PRACTICAL WORK: Absorption, Transport, Storage and toxicity of vitamins

Unit-V: MINERALS (6HOURS)

Mineral elements in food - source and daily requirements of ca, Na, K, Mg, Fe and P.

SELF-STUDY: Effect of mineral imbalances in food.

PRACTICAL WORK: Estimation of Ca, Na, K, Mg, Fe and P in food.

CONTENT BEYOND THE SYLLABUS

1. Functions of food.
2. Types of adulteration.
3. Process of preservation.
4. Deficiency of Vitamins.
5. Requirements of Minerals.

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 Bangalore printing and publishing Co.,Ltd, Bangalore.

REFERENCE BOOKS

1. N.Shaguntala Manay, M.shadaksharaswamy, Foods Facts and Principles, second edition, New Age International Publishers, New Delhi .

2. B.Srilakshmi, Food Science, Second edition, New Age International Publishers, New Delhi.

3. Dr.Kusum Gupta, Dr.L.C.Gupta, Abhishek Gupta, Food and Nutrition, Fourth edition, Jaypee Brothers medical publishers, New Delhi.

ONLINE SOURCES

1. https://Foodandnutrition.net

2. https://www.edx.org

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